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Science Fiction

JUNE 1946

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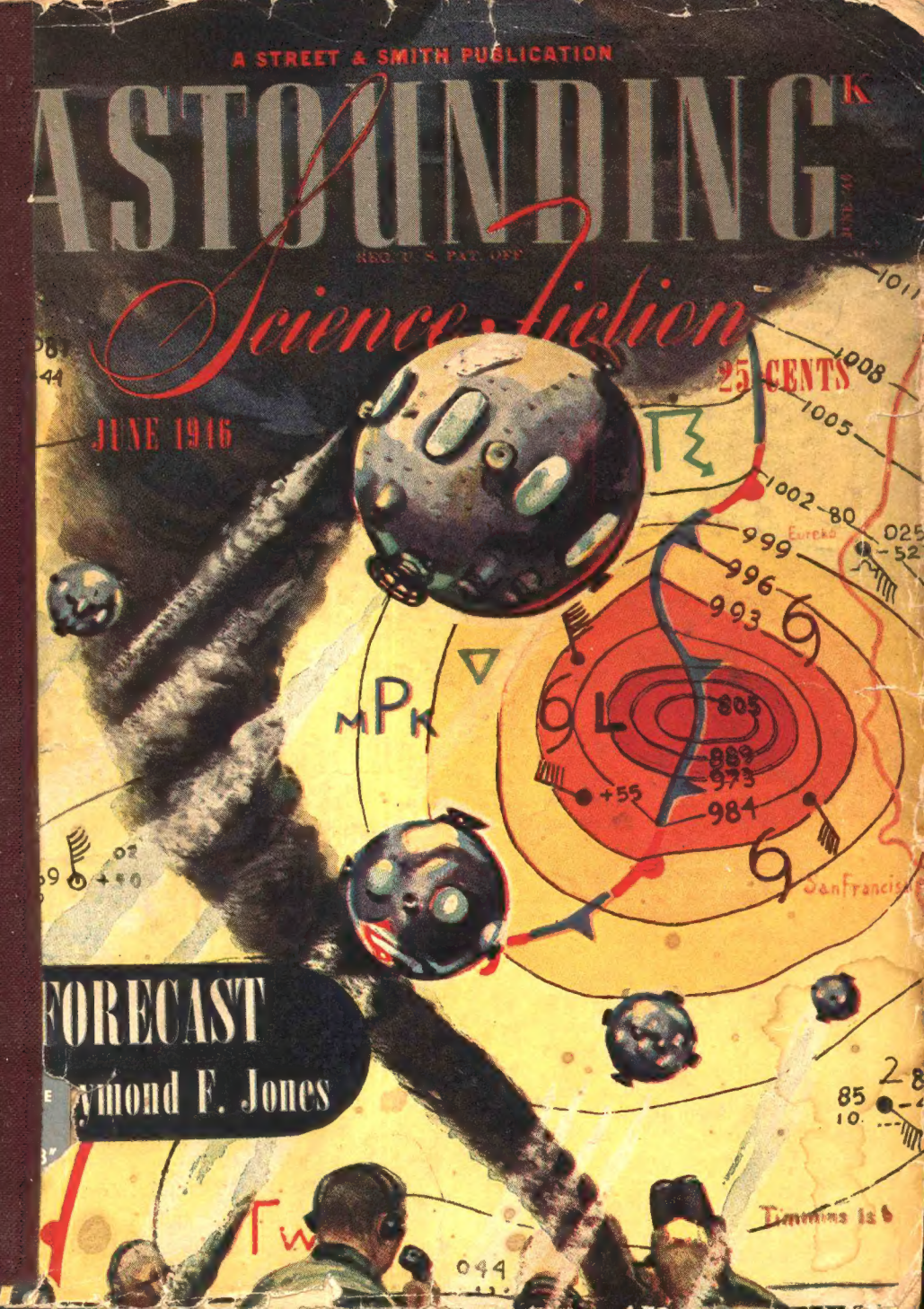


FORECAST

Raymond F. Jones

The "*Bottle Bacillus*" (Pityrosporum Ovale)

Why the funny hat, Pal?

"Sure, I may look silly. But I'd rather be silly than sorry . . . sorry about picking up a case of infectious dandruff. When a big dermatologist says wearing a night-cap is a swell precaution against germs, that's good enough for me."

If you won't wear a night-cap—and the chances are you won't—you will find Listerine Antiseptic and massage a superb alternative. It has helped others wonderfully. Why not you?

Kills "Bottle Bacillus"

If you have the slightest symptom such as flakes, scales, or itching, don't try to laugh it off . . . you may be in for real trouble. Get started at once with Listerine Antiseptic and rotary, finger-tip massage. It's so easy, so simple, so delightful; no mess, no greasy salves or lotions.

Listerine Antiseptic really goes to work on infectious dandruff. It gives hair and scalp a cool and stimulating antiseptic bath that kills millions of the "bottle bacillus" (Pityrosporum Ovale). This stubborn, tough germ is looked upon, by many dermatologists, as a causative agent of this annoying condition.

The Tested Treatment

If you don't see quick improvement, repeat the treatment twice a day. Surely, a method that has helped so many may help you.

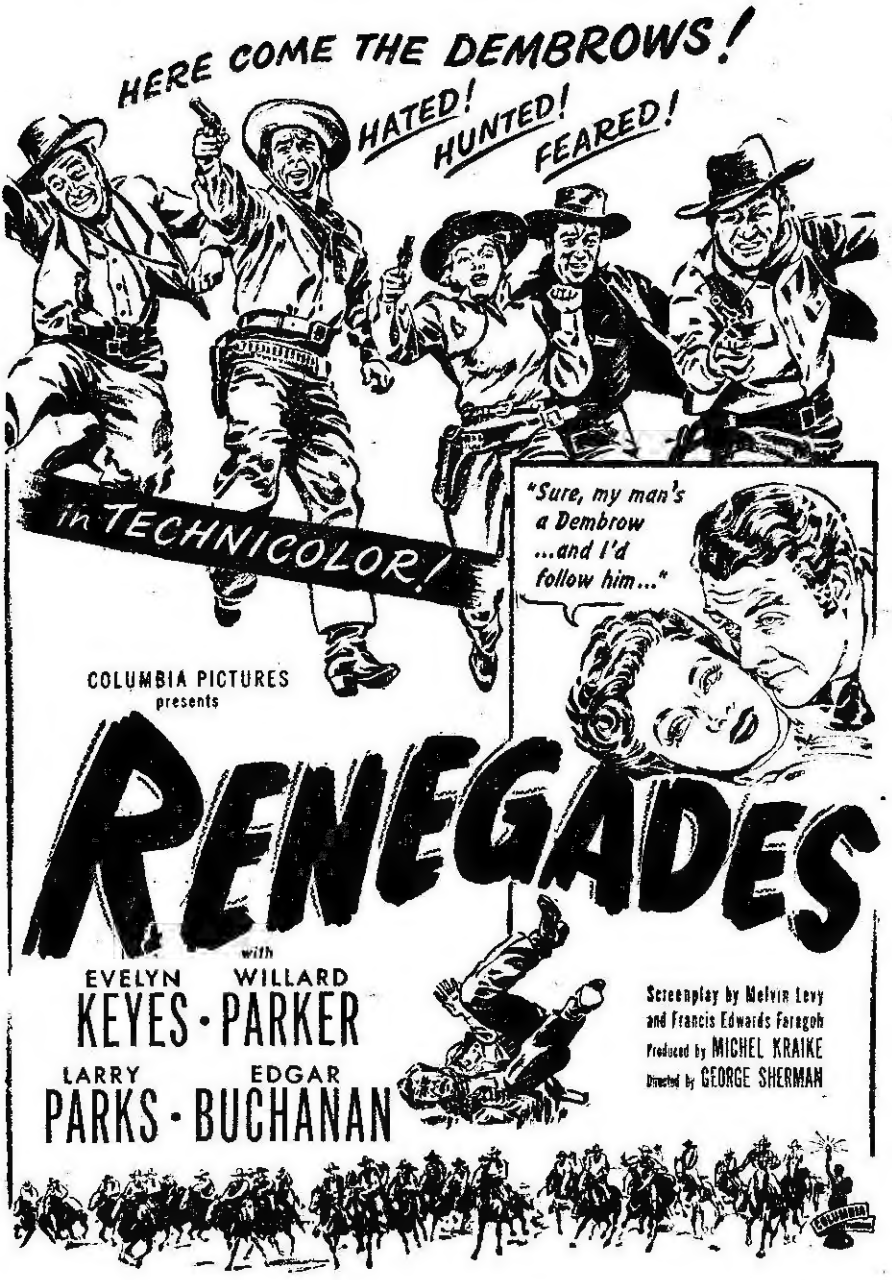
Just remember: the Listerine Antiseptic treatment within 30 days brought complete disappearance of, or marked improvement in the symptoms of dandruff to 76% of those men and women who used it in a clinical test.

Listerine Antiseptic is the same antiseptic that has been famous for more than 60 years in the field of oral hygiene.

LAMBERT PHARMACAL CO., *St. Louis, Mo.*

MOLDS

Infectious Dandruff? LISTERINE ANTISEPTIC—Quick!


HERE COME THE DEMBROWS!
HATED!
HUNTED!
FEARED!
in TECHNICOLOR!
"Sure, my man's a Dembrow ...and I'd follow him..."
COLUMBIA PICTURES
presents
RENEGADES
with
EVELYN KEYES · WILLARD PARKER
LARRY PARKS · EDGAR BUCHANAN
Screenplay by Melvin Levy and Francis Edwards Faragoh
Produced by MICHEL KRAIKE
Directed by GEORGE SHERMAN

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SCIENCE FICTION

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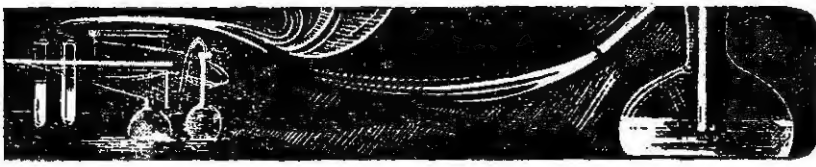


Secrecy and Death

It's hard to prevent all accidental deaths, though there is a totally unnecessary number of them. But there is no excuse for the continuation of death by cancer. Our civilization today has all the weapons necessary to launch an attack which could wipe out cancer. We know enough about it now to know that it consists of anarchy of the body's own cells—cells growing without restraint or plan. There is a difference in the metabolism of such cells, and that difference could be used to permit an attack on them that would not harm normal, organized tissues.

The great difficulty in finding methods of using that difference to make the attack effective has been the slow, slow progress that can be made by a blind hunt, trying one thing after another, to see if any of them show effect. For instance, it might be that substance A was not absorbed as readily by cancer cells as normal cells, but was harmless to both. There would then be no normal way of discovering this fact. B might be absorbed by cancer cells very selectively—but harmlessly. There would be no sign that anything at all happened. C might be absorbed about equally by both types, with serious harm to both. Marked destruction would be observed. D might be absorbed twice as rapidly by normal cells as by cancer cells, but have the property of being twice as poisonous to cancer cells as to normal cells. The investigators, studying only what results were produced, would find that the substance was equally poisonous to both.

If the investigators were able to know that substance B was being absorbed selectively by cancer cells —rapid, definite progress would probably follow. B itself might be harmless to both cancer and normal cells, but if B is being selectively absorbed by cancer, then there are probably modifications of B that will be selectively absorbed—and which will be highly poisonous. Once the basic germ-destroying power of sulfanilimide was discovered, chemists cooked up one modification after another, altering the solubility, the relative toxicity, and various other factors—the sulfadiozoles, sulfaguanidine, sulfa this and sulfa that. All, though, retain the basic structure that makes them selective germ-killers.

Similarly, if we could just find one synthetic organic compound

(Continued on page 178)

The voices rose in icy screams, wailing and sighing and calling out to him, a thousand throats echoing terror and fear.

One moment there seemed to be an infinite number of wailings tearing at his senses. Then they were gone and there was only one, a deep and thunderous voice of a strong man filled with fear.

It began a new chant and the others slowly joined in the awful chorus: "You aren't wanted, Jim November. Your kind are not wanted. We don't want you, Jim November. And you are afraid because you know you are spreading destruction and ruin.

"The weather ships are doomed, Jim November. You are doomed. You are falling, falling, falling—"

The high wailing ended in a shriek of wild, hysterical laughter that vanished in insanity.

Jim November tried to look up, but pressure on the back of his neck forced his chin to remain nearly upon his chest. His body was streaming with sweat that was intermittently chilled with a draft of cold wind. Then the steaming hot breath of the darkened room closed about him again.

How long he had been strapped in that chair he did not know. It seemed many days but his reason told him it could not have been more than one.

Bound immovably, he had listened to the insane voices of the wind. They had begun so low and tremulously that his senses had scarcely been able to detect whether the sounds were in the air or were only products of his imaginings.

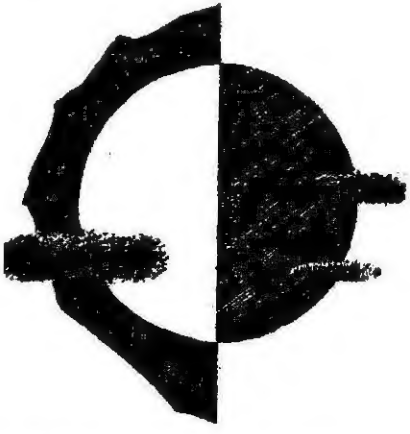
Then, one by one, the voices had become audible. Through the hours they rose in slow crescendo, crying their message of numbing, paralyzing fear into his mind.

And in the darkness he kept seeing a vision of great heights and felt the sensation of tumbling down from them, ever falling, but never striking the infinitely distant earth below. It was a vision of rushing

Forecast

by RAYMOND F. JONES

Even if you can control the weather—the weather won't satisfy everyone. And if someone's dissatisfied, that means a fight—



Illustrated by Swenson

lights and the whine of air about his head.

Sick from vertigo, he dropped his head to his chest, but the pain of his cramped position forced him to throw it back against the unyielding pressure that forced his neck down.

"You are ruining a world, Jim November, and man will not let you. You are doomed, and all your great ships. They shall fail and fall. You are falling, Jim November. You are falling, falling, falling—

"You are afraid, afraid, afraid—"

The chorus swelled. He fought against the straps that held him. He tried to close his eyes against the vague, rushing lights within the room. But the instant he did so it seemed as if a tremendous blaze of light was thrown against his face and burned through his eyelids.

He tried to hang onto remnants of sanity and recollection. He tried to hold to the concept of his name, Jim November, the name he had taken to remember the month in which he had first found kindness.

He tried to remember that this was all a nightmare and that in a few moments he would awaken in his hotel room. This was the day he was to take the weather ship pilot's examination that would culminate three years of intense study and training.

In just a few hours now he would be before the Board to hear their judgment upon his work. Just a few hours now—

The sweat streamed anew from his body. It was hours past the time he should have awakened. He had been in this room for hours—days—he could not think. The screaming, fear chilled voices of wind were in his ears, and the lights were spinning in his vision. The pit of his stomach twisted with sickness.

He roused with a stinging pain between his eyes, and the back of his neck ached with stiffness. He was lying upon his bed in the hotel, fully dressed, and the light streaming through the window was of a sinking sun.

He glanced wildly at the clock and leaped up, poised a moment in the agony of the pain in his neck and then stepped to the phone. The automatic tape showed him that five calls had come in for him during the day.

And they had all been from the Examining Board of Weather Central.

He groaned audibly and called the Board. The face of the little blonde secretary he remembered in the outer office appeared almost immediately.

She frowned at his question. "Yes, the Board tried to call you. Three others were examined and then the Board recommended your disqualification because you failed to appear or show reason. Your hotel clerk informed us that you had come into your room in a drunken state and could not be roused."

She cut off and Jim November stood in a daze staring at the small screen long after it had gone blank.

Drunk!

He shook his head. He had not been out of the room for nearly three days. He had spent the entire time since coming to the city in study. His only communication had been by phone.

He sank down upon the bed and for the first time realized that he was trembling, that he had been trembling violently ever since he rose from the bed.

Then it burst upon him all over again, the terrible fear of that nightmare, those wailing, accusing voices that cut through every protecting layer of his soul.

He felt a sudden gladness that he had not been able to go before the Board. A terrible fear of them shook him, and at the same time he felt the horror of it.

For three years he had concentrated on the single goal of becoming a pilot of a weather ship. To achieve that goal he now had to pass inspection by the Examining Board of Weather Central. He had been confident and sure of his ability to pass the day before. Now he trembled at the thought of appearing before the Board.

That nightmare!

But it wasn't a nightmare.

He remembered the struggle in the night, the clutch of hands that slugged and twisted his body a fearful moment before consciousness vanished.

He knew that he had been taken bodily from the room to that place of darkness where the winds had howled like living voices and fear had been bred in his soul.

He rose slowly from his sitting position on the bed and went to the screen again. He called the hotel clerk.

"Why did you tell the Board who called me today that I was drunk?"

The thin-faced man smiled fatuously. "We sent a boy to try to rouse you, sir. We even called the house doctor, but he said it would be best to let you sleep it off."

"You're crazy. I wasn't drunk. I haven't been out of this room in three days. I haven't had a drop of drug in here."

"At least four people can recall seeing you leave last night, and more than a dozen had to get out of your way as you staggered into the lobby this morning. Two of the boys helped you up to the room. Yes, you were quite drunk, sir."

Jim cut the circuit without further argument. He *knew* that he hadn't gone out of his room. He *knew* he had been taken. There was no point in arguing with the desk clerk. What had happened to him during the night, anyway?

The fear of the unknown, coupled with the agonizing, everpresent anxiety and fright within him forced him down again. He put his head in his hands and felt the sweat break out over his body.

Then, with a tremendous effort, he rose once more and placed another call. There was a long wait this time and at last the screen cleared for the image of a square, stern face surmounted by a long, backward sloping forehead and a shock of faintly graying hair. It was Samuel Stillman, Chief of the

Committee of Forecasters of Weather Central.

"Well?" the man said.

Jim November struggled with the fear that welled up commanding his hand to cut the circuit and get out of the presence of this great man.

When he managed to open his mouth his voice stuttered and the words came haltingly.

"I'm Jim November," he said. "You don't know me, but I was to appear before the Board today for examination. I—"

Samuel Stillman's eyes hardened. "Yes, I recall your name now. You were so enthusiastic last night in celebrating your expected appointment that you couldn't show up this morning. I don't suppose you had ever been informed that weather ship pilots never use a drug —*never.* I'm sorry, but there is nothing that I can do for you. Good night."

"Please, sir! You've got to listen to me. I was not drunk. I had not left my room for three days. I . . . I was kidnaped."

Samuel Stillman halted in his movement to cut off. "Eh? What's that you say? Kidnaped? By whom?"

"I can't answer that. I don't know. I don't remember being taken out of this room or of returning to it, but I know that *someone* took me out and tried to make me afraid of becoming a weather pilot. I know this sounds fantastic, but—"

Samuel Stillman's face had undergone a change that was like the change that must have taken place eons ago when molten substance hardened to become rocks and mountains of stone.

"Will you please come over to my office?"

"Tonight?"

"At once. You must tell me exactly what happened to you. You are either a lying young pup and an impostor or you have encountered something of extreme importance to us. I want to find out which."

Jim November felt better when he broke off. Some of the fear had gone out of him and his knees were almost steady. Samuel Stillman affected people that way.

Jim washed and changed clothing quickly. He hesitated about eating and decided against it though his stomach was empty. He could conduct himself better before the Chief Forecaster if he were not sated with food.

He descended into the lobby of the hotel and stood watching for a moment the desk clerk whose back was turned. Jim knew it would do no good to speak to the man. He had obviously lied about seeing Jim leave and come in drunk. But what of the witnesses the clerk had said he could produce? Jim wondered what would happen if he asked to see some of them.

The prospective interview with Samuel Stillman was too important to investigate any of these questions now. Jim began to have a fantastic hope of still having some chance to become a weather pilot.

He took an express subway that would carry him the forty miles across town to the Forecasting Unit of Weather Central in less than half an hour.

In the car, the monotony of its whining wheels against the rails and the darkness of the tube hundreds of feet below the surface of the earth brought back again that nightmare fear experienced when he had been confined rigidly in darkness. He heard again the whine of those jabbering, accusing voices speaking from the rails of the car. The faintly swaying motion brought back the vertigo of those spinning lights and he was falling—

He jerked himself up with a spasmodic effort, and was thankful that he had decided against eating.

He pressed the button on the news speaker on the back of the seat in front of him. He scanned the headlines rapidly by pressing the selector button. There was little of interest until near the end. One flashed on and caught his attention.

"Weather Central Meets Fresh Opposition."

He turned on the voice of the speaker that would give him the details. On the small screen there appeared the image of a dozen silver spheres floating in formation far above a sea of billowing clouds. Weather ships.

As he watched them, Jim November felt the yearning surge that he had first felt when, as a boy, he had watched those ships rise from their port not far from his home and speed northward to seize an embryo storm system and bring it sweeping down over the mountains and plains of America. He knew again that there would never be any satisfaction for him except at the helm of one of those great ships.

The voice of the speaker pattered out like a rain of nails on a tin sheet.

"A fresh outburst of opposition has broken out simultaneously in all parts of the country against what is termed the 'arbitrary control' of Weather Central.

"This new storm of protest broke this morning with the initial release of the official forecast for the next six months.

"A. B. Hartman, Chairman of the Fruitgrowers Association of the Pacific Northwest asserted that the forecast as issued would mean the loss of at least two million dollars to the members of his Association. The date of the first frost in most areas should be postponed at least two weeks, he stated, and he demanded that the Committee of Forecasters take immediate action to modify their forecast.

"At the same time the wheat and corn growers of the Middlewest are demanding even more precipitation than the forecast calls for. Their complaint is that the shortage of moisture is going to mean at least a twenty percent loss unless they are guaranteed more.

"The Recreational Area Association has protested the projected rain in most Rocky Mountain areas during the latter part of June or the first part of July. They estimate their losses at eight million dollars

if rain falls as late as July 2nd in the quantities forecast.

"You may recall that several suits are still pending against Weather Central as a result of last winter's storm which got out of control for three hours and caused nearly twenty million dollars worth of damage and the loss of eighteen lives.

"Samuel Stillman, Chief of the Committee of Forecasters, or Howard Donovan, Executive Chief of Weather Central, were not available for comment late today.

"Listeners will recall the tremendously growing opposition which has appeared during the past three years. The Fruitgrowers Association has already adopted a proposal calling for a bill to be put to Congress for the dissolution of Weather Central and the abandonment of weather control entirely.

"Simultaneously, Minister J. V. Backwern has declared that the nation could profitably return to the judgment of God in the matter of weather. He asserts that man got along well enough for quite a number of millennia, and there is no reason now to create such confusion as exists over the control of weather."

Jim November snapped off the news report and the lines of his face deepened in a grimace of disgust. "The fools!" he murmured.

But he knew the gravity of the situation. In the past three years opposition had grown like a giant snowball gathering weight and momentum.

The fruitgrowers wanted to name the exact dates of killing frosts in the spring and fall. But this conflicted with the coming of storms that were necessary for irrigation of other crops. The resort owners wanted at least thirty days during the year absolutely guaranteed free from rain, and the winter sports operators were beginning to demand specific snow depths to the fraction of an inch.

It would serve them right, Jim thought, *if Weather Central went out of existence and turned the weather back to the erratic status of twelve years ago and the thousands of years before, during which man had struggled against the whims of nature.*

He regretted the thought almost instantly. It was childish to even consider any end worth abandonment of the savings of over two hundred million dollars in property and three hundred lives a year which Weather Central had accomplished.

No, Weather Central would go on. Its own results would force its continued existence. This was only a repetition of the history of the first sailboat, the first automobile, the first spaceline.

With a start, Jim realized he was nearing his destination. He rose with the swarm of passengers to board the next debarkation capsule, which would be released from the fast express without a pause in the plunging flight of the train.

Weather Central had no exterior uniqueness that identified it as the controlling point for the weather of

the North American Continent. It was a twelve-story cube of marble near the center of the city, but though it created and dispersed the storms over a nation it could not disperse the ever-growing storm of opposition that was gathering about its own walls.

Jim November went up the broad marble steps and into the corridor.

"Jim November to see Samuel Stillman," he said. "He's expecting me."

The girl nodded and directed him to the elevator. He got out on the tenth floor which was occupied by the synoptic reports section.

A half dozen assistants were moving about the room, examining the reports that were constantly flowing in from all sections of the country, but Samuel Stillman was standing alone near the great map that showed the constant movement of a dozen isograms.

Jim November advanced towards the chief forecaster as Stillman's eyes turned upon him. Lights over the map were not turned on and it seemed to Jim that the man's eyes had an almost magnetic light of their own in the half darkness. The light was reflected from other parts of the room, but the illusion was not dispelled as Jim slowly approached.

Those eyes were scanning him minutely, every detail of his dress and features. Unconsciously, Jim straightened his already flat shoulders a trifle more.

"You're Jim November." The voice was resonant, implacable.

"Yes, sir."

"And you think you can be a weather ship pilot and get drunk whenever you feel like it."

"I was not drunk, sir."

Those eyes watched carefully as he said it and Samuel Stillman replied, "I believe you. Come in here to my office."

The forecaster turned and led him to another room where they sat down on opposite sides of a desk.

"I've been examining your records since you called," said Stillman. "They are very remarkable. I should hate to lose a potential pilot of your caliber."

Jim half rose. "Then you mean there is a chance—!" He exclaimed excitedly.

Stillman's expression did not change. "Tell me exactly why you did not show up for your examination before the Board today."

The reminder of that horror sent fear swirling through his nerve channels again and Jim's hand shook as he drew it down from the edge of the desk. His eyes averted.

"I thought it was a nightmare at first," he said haltingly. "But afterwards I could remember the sense of someone attacking me and overpowering me in my room. It was so vague that it hardly seemed real but I know that it was. I was taken from the room and into some dark chamber where I was bound in a chair and my head bent forward so I could not look up. Then for hours I heard nothing but voices like wind and spinning lights that made me think I was falling from a great height."

"Those voices—what did they say?"

"They told me that I was not wanted. That people didn't want the weather ships. That I would fail. They . . . they made me afraid."

"Which is exactly what they intended to do."

Jim looked up sharply. "You know what this is about?"

"Did you ask the hotel clerk about his report of your drunkenness?"

"He said he had witnesses to my coming and going. But I swear I didn't leave that room under my own power!"

Stillman looked down at the records before him. "November—that's a rather unusual name. I see that it is not your real one."

"I was abandoned when I was a baby. Some people named Smith took me and gave me all the care they would have given their own son. They never learned my name and so they called me Jim November after the month in which I came to them. I kept it officially as my own in memory of them."

"Hm-m-m— I wonder if that accounts for the amazingly high index of social responsibility which you exhibit. It is higher than that of any pilot we now have."

"I think I always felt a suppressed resentment towards the parents who abandoned me, as individuals. In contrast, I love the Smiths as members of a society which cared for me when I needed it."

"Social responsibility," said Stillman, "is the key index which determines the value of a pilot. Technical ability, while essential, is always second to it.

"Our pilots, when at the controls of their ships, have power over more lives and greater amounts of property than any other men alive. Altering the speed of their ships or the intensity of their attraction fields could mean the difference between beneficient rains and destroying floods. The example of last winter's failure when a large storm system went out of control for three hours shows what can happen. That instance was a technical one and not a human factor failure, but it illustrates the point. Five of the pilots who were in that storm never went up in a weather ship again.

"The men must have a sense of responsibility about what they are doing, an understanding of the social import of their work that borders the pathological. As a result, the turnover among our pilots is high. And the increasing public agitation is not helping the matter any. Sensitive men are the most quickly affected by adverse factors, but sensitive men are required to do the job.

"That is why I said I should hate to lose you as a pilot—because of your social responsibility index."

"Can you tell me what this is all about—the things that have happened to me?" Jim pleaded earnestly.

"I feel quite certainly in my own mind what the meaning of it is," said Stillman after a moment. "All of us here in Weather Central feel

sure of it, but we haven't been able to prove it or do anything about it. Let me ask you: Who has benefited most by the introduction of weather control?"

Jim frowned. "That would be hard to say. The most obvious answer is the food industry, rather, the dirt farmers. They have risen almost from extinction because of it."

"Right. And who has been harmed most by weather control?"

"I couldn't answer that one. A dozen organizations have been swearing for the last three years that their members are being put out of business by it, but they seem to go on."

"Think a moment. What corporation that has made no public objection whatever would be hurt very badly?"

Jim November thought a moment, then his face lighted. "Of course! Hydroponics!"

Stillman nodded. "That is our conclusion, too. No proof, you understand, that would stand any examination, but we are certain that it is a fact. Hydroponics is trying to put Weather Central out of operation.

There was a silence in the room for a long moment. Jim November thought of what he knew of the giant, International Hydroponics, Inc. The gigantic corporation for forty years had held almost a world monopoly on the production of plant food. They grew absolutely all of the vegetable produce consumed in commercial quantities. The only dirt farmers who had persisted in holding out were a few of the fruit and small grains growers such as those currently protesting Weather Central's forecast. They could still compete on a small scale with Hydroponics, but their numbers were insignificant in comparison with the great farm industries of even a century earlier.

There was no competition whatever with the lush growth of vegetable products in Hydroponics' great tank farms, but the cost of growing grain in the tanks was not appreciably less than growing directly in the ground. It was in the cost of transportation that Hydroponics had the advantage. They could locate huge grain tanks near centers of milling and population and so undersell the dirt farmers by a small but determinant fraction in most of these markets.

But with the coming of weather control all this picture was reversed. Proper fertilizing methods, cheap farm machinery, plus the added certainty of adequate moisture at the right time enabled the dirt farmers to compete on a more than even basis in almost any item of produce. They did not require the huge capital outlay and expensive maintenance for vast tank farms. Their crops were certain now that the weather was no longer a vague factor and insect pests did not exist. Their costs per unit production were in the majority of areas now more favorable than those of Hydroponics.

The giant had a competitor for the first time in its history and it

was obvious to those in Weather Central that the corporation would not submit to a slow squeezing out process without a bitter fight.

Samuel Stillman began speaking again. "Hydroponics cannot object to Weather Central directly. Its reasons for any such opposition would be immediately obvious and react unfavorably to their public interest. So they are employing every indirect means possible.

"Actually, it should be no concern of ours who wins the food market. The result of weather control has been cheaper food for the public. But Hydroponics had reached the limit of economic production and there is nowhere for them to go except out of business or put the dirt farmers out. Destroying us is their only possible means of accomplishing the latter."

"But what does this have to do with what happened to me?" asked Jim.

"Up to now Hydro has concentrated its efforts on outside opposition. The loud cries of the Fruitgrowers, of the Recreational Association, of the ministers are the result of paid intervention by Hydro in these organizations. Now their attacks are becoming direct and personal. You have shown us the beginning of it.

"They subjected you to a hypnotic stimulus to create a fear in you that would make you helpless as a pilot. But consider the vast organization and detail that was necessary to accomplish it. The hotel clerk and many other employees are a part of it. They had assembled witnesses who would swear to seeing you drunk. If I did not choose to believe you, you would not have a chance to defend yourself against a charge of drunkenness that would prevent you from ever becoming a part of Weather Central."

"You will still give me a chance?"

"More than you expect. First of all, I want you to take up living quarters in the building. They will be assigned to you. Tomorrow, Dr. Winters and his staff will treat you in the psych department to check up on my intuition to believe you and relieve your mind of the fear pressure that has been induced.

"If you come through all right I'm going to ask for your help in the most critical part of all our fight against Hydro's opposition. I want you to help us find the members of our own organization who are working for Hydro."

Jim November stared at the chief forecaster in disbelief. "But surely none of them are here!"

"No? How do you suppose they singled you out of the four applicants to be examined today? It was no accident that they nearly succeeded in destroying the one most valuable to us. They picked you because they had access to your records which were filed here."

"What about my examination?"

"I'll give you temporary recommendation for pilot status on the basis of your training and preliminary record. After you complete your assignment, and if we're still in business, I don't think there will be any question about the Board

approving your permanent pilot rating."

The psychological examination at the hands of Dr. Winters the following day was supposed to be conducted with Jim's mind at ease, but it was a gruelling thing because he knew that all his life's ambitions might depend upon it. He was not afraid of anything he knew was in his mind. But what might the previous night's horror have placed in his subconscious ready to spring to life in the midst of some crisis?

But Weather Central's chief psychoanalyst, Dr. Winters, and his staff of examiners passed him. Afterwards, they subjected him to a conditioning process to remove the hypnotically induced fear that had been created in his mind by the agents of Hydroponics.

It was like the lifting of a great weight that had been crushing in upon his soul. He hadn't realized the burden of it until it was gone. He felt that he could approach Samuel Stillman with new strength to perform the work to which he had been assigned.

The examination over, Jim did not see Stillman, but Dr. Winters took him to Thomas Wentworth, head of the synoptic reports and map section. Wentworth was a small, middle-aged man with one eye on the future life and an overwhelming passion for statistics.

To him a vast page of figures summarized with means and media extracted and drawn upon a graph was the most exquisite thing in the world.

He extended a welcoming hand to Jim November as he came into the room.

"He's perfectly sane," Dr. Winters said smiling. "Stillman has instructed me to ask you to conduct him personally for the next few days."

Wentworth beamed upon Jim as if he were some rare specimen for a collection. "I shall be most happy. I always say if a pilot gets a good grounding in synoptics he will know what he is doing when he is in his ship. That's why I'm always delighted to be called upon to personally introduce new pilots to our synoptic section. Thank you, doctor."

Winters nodded and left Jim to the little synoptic director.

"I suppose you think you are quite familiar with our work here already?" said Wentworth, peering through his ill-fitting spectacles.

"Well . . . I had a good deal of meteorology and synoptic study in training . . . along with learning how to pilot a ship. After all, I spent three years—"

"Not worth a damn . . . not worth a damn—" said Wentworth. "That's what I've found out in my experience here. It takes real practice and actual work to become familiar with the synoptic end of Weather Central. Now if you'll come over here—"

Amused by the bustling, earnest little man, Jim November followed him across the room to the huge map he had seen the night before. It was a vertical, hundred-foot square map with slowly moving,

luminous isobars and isotherms writhing with microscopic motion across the surface. At varying altitudes, transparent, tinted planes of isentropic surfaces tilted and shifted with the slow progress of the air masses that were pouring across the continent.

Green spots of shifting intensity indicated precipitation areas and shifting arrows indicated wind direction and velocities.

Wentworth pointed in pride. "That's our masterpiece — even more remarkable in its own way than the weather ships in many respects. It is entirely automatic and is controlled by over three thousand unattended radio reporting stations.

"As you see, the isograms move constantly in conformity with actual conditions. The data controlling the map are fed into computers which synchronize the precipitation rate with permissible runoff values and indicate the speed at which the air mass must be moved or raised or lowered to give the desired precipitation without the danger of flooding. The data are automatically sent to the weather ships in terms of trajectory rates and co-ordinates."

Jim was fascinated by the map. He had heard of it, had studied from a smaller class model of it, but this was his first opportunity to examine the real thing at close range.

He knew the details of the mechanism that kept the isobaric lines moving in conformity with the changing air pressure over the continent. He understood the intricate computers that gathered the data from three thousand sky-probing radio beams and extracted the heights of the various isentropic planes desired. But it was still a marvel to him to see the lines creep over the surface of the map and the pastel shades of the isentropic planes slowly rise and fall and shift angles of inclination. The motion was so microscopic as to be undiscernible unless he concentrated on a single spot for a long time.

"It's very—beautiful," said Jim.

"I knew you'd appreciate it. I might say that I had no small part in the design and construction of this map. If you'll step over to the observation chair, you can examine its surface with the telescope—"

Jim stepped back and put his eye to the mounted telescope and swung it over the surface of the map. Detail stood out in infinite clarity as if he were viewing the Earth from a height of ten thousand feet. Tiny details that were unnoticed previously now stood out. Jim felt that he could almost see the rain falling and the runoff flowing down the valleys.

Somewhere up above the continent fifteen or twenty weather ships were slowly dragging an mP air mass across from west to east, holding it in leash with their traction fields, controlling its cyclonic winds and its stability according to the precipitation pattern determined by the forecasters.

Since man first saw clouds in the sky his desire had been to control the capriciousness of the weather.

Many and fantastic had been the schemes proposed to make rain. Great, broad mouthed guns had shot their charges at the heavens, and electrically charged sand had been sprinkled upon the clouds in addition to the wailings and laments of witch doctors and fanatics. But the heavens had remained beyond the control of man.

"What kinda weather you making for us today, Doc?" had been a standard joke in the presence of Weather Service employees for three centuries. Mark Twain's ancient but truthful gag had long outlived its usefulness but still no one found power to do anything about the weather.

The greatest impetus to understanding and control came in the early twentieth century with the discovery of the principles of the famed air mass theory by the Norwegian meteorologists. Only then did the fallacy of the cloud shooting and sand sprinkling become apparent.

The nature of the weather at the Earth's surface depends upon the nature of the air mass above it. If that air mass is dry no amount of Mumbo Jumbo can squeeze rain out of it. The air must be replaced.

It was ironic that the method of controlling these mighty air masses should have been discovered quite by accident.

It came about with the introduction of gravity drive on the Earth-Mars space line. The first trip was made from the Chicago terminal and immediately afterwards there came such a cloudburst as had never before been recorded in the weather history of that city.

The first time was thought a coincidence. The twentieth time brought loud protestations from the local Chamber of Commerce that Interstellar Lines, Inc. take its field to points far removed from the city, which was now watery as well as windy.

But puzzled researchers both in Interstellar and in Weather Central had been investigating for weeks before they finally saw the utterly obvious answer.

As the ships rose from the field their gravity repulsion force extended far beyond the bounds of the hull and they pushed above them a tremendous column of air. When the ships finally slipped beyond the atmosphere they had created a violently unstable air mass over the city which had every drop of water squeezed out in a cloudburst that lasted twenty minutes.

The next step was only a formality, the deliberate designing of a ship with a repulsion or attraction field that would control a large volume of air. The maximum efficient range was fifty miles, but the viscosity of the air allowed a spacing of a hundred and twenty miles. It was physically possible then to control an air mass of any size by ships whose number was entirely within the limits of feasibility.

As Jim November watched the isogram lines through the graticule of the telescope he thought there should be a representation of the controlling weather ships, for the

weather picture as it was shown would not have existed without their presence.

His thoughts were suddenly interrupted by the raucous jangling of an alarm gong. He looked up quickly. Wentworth had turned and cocked his head like a frightened bird.

"Flood!" he gasped.

Jim understood. At some point on the continent the precipitation had passed the critical point of permissible runoff and in a valley or riverbed a flood was forming to sweep down upon lands and buildings or town that might lie in its path.

Another black mark against Weather Central and tomorrow the newscasts would scream the fanatic demands of Hydroponics' paid agitators for abandonment of Weather Central.

A red spot flashed upon the map in the Rockies. Wentworth shoved Jim roughly aside and trained the telescope upon the sector. He noted the co-ordinates and went to a small, horizontal map table.

Punching the keys of a board in front of the small map he located an enlarged picture of the flood area. At each point where a reporting station was located figures appeared showing the rate of rainfall per hour at one second intervals. Wentworth touched another button and beside the rainfall figures there appeared the critical values for those stations.

The little synopticist gasped. "Two inches excess at Mountain Vale!" He made a hurried mental calculation. "Sprinton, Colorado will be flooded within three hours!"

Other assistants were standing by now, but there was nothing they could do to help. Wentworth did it all. He jumped to the communicator panel.

"Ships twelve and sixteen: Produce downdraft over Mountain Vale area. Hold to no precip in entire drainage area.

"Emergency Service: Order evacuation of Sprinton, Colorado, within two hours and a half. A flood is forming in Mountain Vale that will cover the town to four and six-tenths feet."

Then he called Samuel Stillman. "Flood at Sprinton, Colorado. Did you hear the warning?"

Stillman's face appeared. Behind him, Jim glimpsed the blurred image of Dr. Winters. Stillman said, "I heard the warning and your emergency measures, Wentworth. You have done all that can be done for the present. Now, what caused it?"

"I have no idea, sir. Our critical values—they couldn't be wrong." He seemed to tremble at the thought. "The Mountain Vale station showed an excess of two inches per hour. It had been falling long enough at that rate to give the calculated runoff. I don't understand why the warning was so long delayed."

"Get to work on it. Find out why the circuits failed to correct the trajectory of the air mass be-

fore the flood runoff was obtained."

Stillman cut off without a word or a look for Jim November. Thomas Wentworth seemed to collapse as if from an internal vacuum. Jim saw his hands give a momentary flutter and the man's eyes glanced towards his beloved map with almost an accusing look. Jim thought he was near tears at the shameless betrayal of his equipment.

Jim had been forgotten in Wentworth's crushed state. Slowly, the synopticist straightened and called a half dozen technicians who began digging into the wiring behind the map under Wentworth's haphazard direction.

Jim November slipped away and found Stillman's office. He entered as the chief forecaster's voice growled an invitation to come in. Stillman's desperation and anxiety were plain upon his face.

Dr. Winters was still there. Jim looked from one to the other, then demanded: "Why do you keep him on?"

Stillman looked up. "What are you talking about?"

"Wentworth. His incompetence is little short of pathological."

Stillman growled in impatience and Dr. Winters laughed indulgently. "There is no cause for alarm, Jim. We are well aware of Wentworth's deficiencies and his attributes. All his characteristics have been analyzed and allowed for."

"But he could have prevented the Sprinton flood."

Stillman looked sharply. "How?"

"I don't know. I—"

Winters' indulgent laugh interrupted again.

"I can't tell you," Jim insisted. "I'm not familiar enough with the synoptic reporting system, but I know that a more alert man could have detected the failure of the circuit to give adequate warning. Wentworth's reaction time is long enough to eat a meal while he turns around in a hurry."

Jim could see that Stillman didn't believe a word of what he said and the forecaster's irritation was rising along a superadiabat that was rendering his temper vastly unstable. But Winters was amused by Jim's obviously hunch-like conclusions.

"Wentworth is going to be busy for the next few days," said Stillman. "He won't be able to give you any more time until we get this business straightened out. So I'm going to assign you as pilot trainee aboard ship number sixteen in a group that is to bring an mT mass up from the Gulf. You have time to prepare. Crew assignments section will take care of you. In the meantime, forget this business of Wentworth. We all make mistakes once in a while, but don't forget the main business I assigned to you. You're still on that."

Jim felt that he had made an utter fool of himself in Stillman's eyes. His condemnation of Wentworth was too severe and his suggestion that here was the man

they needed to watch was too bold for so early in his investigations. But there was truth in what he had said.

He recalled Wentworth's tragic moment of hesitation when the warning gong sounded. A finely co-ordinated man would not have paused for that posing instant before leaping to his instruments. He would not have gone to the telescope and wasted moments determining the exact co-ordinates of the flood area when they were approximately obvious from the large map and could have been located with only a moment's hunting on the small chart—perhaps instantaneously by an experienced operator.

But Winters had said Wentworth's deficiencies had been evaluated and due compensation taken. Perhaps so, Jim thought, but the man was still either an incompetent or a fraud.

Ship number sixteen of Gulf Flight C was piloted by a don't-give-a-damn young ex-spaceman named Pete Carlson who was only a couple of years older than Jim, but he gave the impression that he had seen everything there was to see and wouldn't take the lot of it for a dime.

He greeted Jim with a careless wave of his hand as Jim approached the huge silver sphere of the ship with his duffle.

"Hi, sucker. Come on in and make yourself to home. Hear you want to see how we shove these air scows around."

Jim responded with a grin. He knew Pete Carlson's type and could take it. He felt he and Pete were going to get along.

"They told me they wanted me to learn from the best they had, so they assigned me to ship sixteen."

"By all the big and little isobars! I must have gotten on the wrong ship." Pete fumbled for his assignment papers. "Nope, sixteen is mine. It's you that must be in the wrong berth, son."

Jim grinned and strode through the circle of darkness that was the port. "I'll take a chance on it," he said.

Seventeen of the spheres rose unpretentiously at midnight. Automatic radio detection spaced them. They shot up beyond the thin heights of the lower stratosphere unencumbered by their usual burdens of hundreds of tons of air. They were hurtling beads of silver to occasional fortunate watchers on air and space liners that chanced on nearby trajectories.

Jim was tired when he first came aboard. Tired and disheartened by the spectacle he had made before Stillman and Winters. He felt that he had made Stillman distrust his judgment, but it was even worse in the case of Winters. Jim felt that he could sense tangible fingers searching about in his brain every time the doctor looked at him. The man's quiet tolerance of the mental quirks and disturbances of his fellow men was unnerving.

The cabin to which Jim was

assigned was a small, metal walled room, but comfortable. For a time after take-off Jim reclined on the bed. He still felt physically and mentally dissipated by the treatment at the hands of Hydroponics' agents.

As he thought of the great, tentacled corporation again the image of Thomas Wentworth appeared in his mind. The cocky, fumbling little synopticist didn't belong in Weather Central. But Jim November knew his presence there was more than a mere anomaly. It was a tragic accident just waiting to happen—or perhaps it had now happened—in spite of the assurance of the psychological department.

Jim rose after a short rest and went out into the corridor and towards the control room.

The control and crew cabins and storage chambers were at the center of the two hundred and twenty foot ship. The vast amount of machinery and control equipment occupied most of the remaining space. The ships were larger than their contents actually necessitated, however, in order to provide the large surface area required for control purposes.

Beside the chief pilot, there was a co-pilot who acted as observing meteorologist during the chief's trick. There were two alternate crew members in each position who stood watch on other tricks, though the ship was mainly controlled by automatic circuits in actual flight. These circuits took the impulses received from the synoptic room of Weather Central and transformed them into units of velocity and trajectory co-ordinates.

In addition, there were eight engine room technicians aboard.

Pete Carlson was sitting at the controls board as Jim came into the room. His co-pilot and observer was busy at the recording instruments which charted the meteorology of the stratosphere.

"We're flying an isentropic," Pete growled as Jim came into the room. Wentworth's got some bug in his ear about a wave formation in isentropes up here in the stratosphere and wants us to fly along them on our outward trips. Can you imagine the old cluck trying to do research on something like that? Why don't they retire him to his knitting?"

"Might turn up something useful," Jim smiled and settled in a chair beside Pete.

"And hear him crow about it forever after—" Pete said. "But here, son, you're supposed to do the piloting on this flight. Take over."

Pete released the controls and Jim placed his hand upon the panel. "Aren't you flying automatic along the isentrope?"

"I was—but you do it manual. Good practice if you can follow the thing. It wiggles around like it knows where it's going, but it's a cinch nobody else does."

In front of them the night scene on the viewing screen and the panel lights over the instruments provided the room's only illumination. Jim's eyes concentrated on

the instruments that indicated the level of a constant potential temperature of 460 degrees Absolute. At their tremendous speed it was like following a road over hills and valleys and it taxed all the intrained skill that Jim possessed. But he had executed similar problems in his training days and this one was nothing new to him.

Pete watched carelessly in silence for half an hour before he commented with seeming reluctance. "Pretty good, son, pretty good for just being out of school."

Jim had not lost the isentrope once.

They came at last into the moist air mass that lay over the Gulf. A weak cyclone was forming tremulously within it without any apparent trends as to trajectory yet.

A signal buzzed on the panel.

"I'll take over now," said Pete. "That's the squadron leader's signal to go down."

Jim released the controls and watched the pilot's tense face as he sent the ship spiraling down almost to cloud level. Beside them, the sixteen other ships, spaced as evenly as precision dancers, swarmed down to seize upon the moist air mass and bring it over the dry Mississippi Valley.

Pete's face in the near darkness of the room did not reflect the calm certainty of a man sure of himself. His jaws clenched until the muscles stood out and the muscles of his hands and arms bunched in tension.

Watching him, Jim felt a wave of apprehension. Subconsciously, the pilot was revealing the existence of some tremendous strain whose existence he so laboriously tried to hide with his don't-give-a-damn attitude.

As suddenly as it appeared his tension broke and he laughed without humor. "Well, little raindrops, here we come. Let's get going."

Propulsion of the weather ships was provided by a narrow, focusing tractor beam which was directed at a constantly moving point upon the horizon, ten miles below the surface of the Earth. It could be used for traction or repulsion as required. Within the ship sudden changes in acceleration were compensated for by the same type of inertia control used on space liners so that gravity in all directions within the ship was constant regardless of the direction or acceleration of it.

By means of the propulsion tractors the ships swiftly maneuvered into position in a circle a hundred and twenty miles from each other. They threw out the vast tractor fields that gripped the air mass in a solid ring reaching from the surface of the Earth to the upper limits of the tropopause. Then they began to rotate slowly in a counterclockwise direction, at the same time moving towards the Gulf shore.

Later, the formation would shift to two smaller, concentric circles

and a slight lift would be given to the mass which would cool adiabatically, dropping its moisture content as needed. The automatic recording stations below would flash their impulses to the great synoptic map in Weather Central and, in conformity with the forecast governing this particular operation, would relay control impulses to the squadron of ships.

It was a scene of vast fascination and inestimable wonder as Jim November looked at the screen as if through a window and watched the swirling clouds beneath them and caught an occasional glimpse of the shoreline as they passed over it repeatedly in their circular trajectory.

The moon lit the cloudscape with reflected brilliance that seemed almost blinding and Jim thought he caught sight of a distant companion weather ship, but he knew it was hardly possible at the distance.

Pete Carlson didn't seem appreciative of the beauties of the night. He sat slumped before the panel, his eyes staring aimlessly at the clouds. The automatic pilot was functioning now.

"Senseless little marbles going around in circles in the sky," Pete muttered.

Jim glanced over at him and that catch of fear constricted his stomach muscles again. Pete's moroseness was deepening far beyond a light cynicism like the cyclone structure they were creating within the air mass about them.

"Snap out of it!" Jim said harshly.

But Pete didn't even look up. He was grinning fearfully. "Ever thought of what would happen if somebody got out of line in this Ring Around a Rosy—if somebody started bumping somebody and he bumped somebody else—"

Jim rose and stared at the screen. That ship he thought he had seen!

It was there, swelling like a balloon under the terrific velocity of their own ship. Pete had cut the communication circuits with the squadron commander and turned off his control tractors. The other ship, now aware of its danger, tried to swerve aside, but Pete had the advantage. They were on a certain collision course. The silver globe expanded on the screen until it blotted out the sky and the clouds—and the details of its seams and hull plates were plainly visible.

Jim leaped from the chair and threw a fist against Pete's jaw in one long motion.

Like a switch the blow cut off Pete's staring vision of the expanding sphere and he collapsed and rolled gently to the floor. Jim stood astride his form and cut the controls from their automatic collision course.

He made an instantaneous estimate of the other pilot's thinking and applied full force of the power plant in a line straight angles to their line of flight.

He had ceased to look at the swelling image of the other ship. But he knew the force was insufficient to avert a collision. At

the last moment his horrified vision showed that Pete had carelessly failed to throw on the inertia control. Jim made a wild attempt to switch it on but he was slammed to the floor before he could reach the button.

An instant before he lost consciousness he heard the crash of the colliding hulls.

Samuel Stillman was pacing the floor. He paused to look out over the spires and columns of the city, then he turned and slumped down in his chair.

"What do you make of it, Winters?" he asked. "How can we fight this kind of thing? I gave Jim the special assignment of trying to find evidence of Hydro's infiltration, but this doesn't require detective work. It looks like something entirely for the psych department. What kind of a person is Pete Carlson that he would let Hydro buy him into an insane suicide scheme like that?"

"I can't say for certain, yet," said Winters, "but something since his last checkover has evidently served to unstabilize him. Some personal crisis for which he required a great deal of money —which Hydro evidently paid him—and was worth his own life to him."

"I don't believe that!" Jim November said. "You didn't see Pete the moment before the crash. I did. He didn't sell out to anybody. There was no clarity of purpose in his mind at all in that moment before he set the controls for a collision. There was only the thought of destroying property that represented a world of superior, overwhelming powers. It was the unbalanced little man striking out at the nearest symbol of power."

Winters turned and his smile was icy upon Jim. "Perhaps you would like to join our psychological staff, Mr. November?"

Stillman raised a hand. "Please, Winters. I asked Jim to do a job for us. I am to blame perhaps if his enthusiasm leads to analyses and judgments on his part which may seem unjustified to you. He's only trying to help in a very difficult and unusual assignment."

Stillman turned to Jim. "Until we get this matter of the Sprinton flood and Pete's accident cleared up I think it would be best for you to go out on a regular run. I am going to assign you as pilot of a ship of your own. You will go out tomorrow in a reinforcement group that is to assist in bringing down an extensive mP mass from the Alaskan Low."

Jim ignored the thrust Winters had made. He spoke to Stillman. "I'll do whatever you think best, but I'd like to see Pete, Mr. Stillman. May I have permission to visit him?"

Stillman glanced at Winters. The psychologist shrugged.

"I have no objections," said Stillman. "Remember the job I've asked you to do, however, and see if you can find out anything—regardless of your own immediate opinions in the matter."

"I will," said Jim.

Pete was hospitalized both for his mental condition and for cuts and gashes that resulted when the collision threw him across the floor of the control room and dragged his face over equipment bolts near the panels. He was not far from Weather Central and Jim walked the distance.

When Jim entered, Pete was lying on his back staring up at the ceiling. Only his eyes and his nose were visible through the bandages. Jim stood silent, wondering how to say the things he wanted to say.

He didn't think Pete was aware of his presence, but the injured man began speaking abruptly. "I hoped you'd come, Jim." His voice sounded muffled through the swathings. "You seem like a good Joe, and there's no one else—"

"What is it?"

"Tell me how we got out. What happened after the collision?"

"It was a glancing blow. I managed to turn us enough to prevent either ship from being destroyed. Some of our crew that were not knocked out brought us out of our uncontrolled flight."

"Anybody killed?"

"No."

"I'm glad. What are they saying about me?"

Jim hesitated. Then, with momentous decision, he said in calm, clear tones. "They think Hydro paid you to wreck the ships."

Jim could not see the reaction that swept Pete's face, but he could guess how he looked from the pain in his inarticulate cry. There were no words in it, but it made sense to Jim. After a moment he knew that Pete was crying softly.

He moved close to the bed. "Tell me about it."

"Six years ago, coming in for a landing on Ganymede— Dot was with me. Our honeymoon. We had our own ship, the *Bumblebee* —silly name—but Dot liked it. We went out of control over the mountains and crashed. I was the only one that came out.

"Weather Central let me in after a lot of investigation. Why they did I don't know. I've been seeing it ever since—that night over the mountains — Dot with me — the crash. Then something came over me last night. I wanted to end it like Dot did and take anybody else I could with me.

"But Hydro didn't have anything to do with it!"

His voice ended in high pitched excitement and he rose to a sitting position. He leaned forward in a pleading for belief.

"I believe you, Pete. I know you're telling the truth, and I'll see that Stillman knows it, too."

Pete relaxed again and fell back against the pillows. "Thanks, son," he said.

Jim did not have another chance to talk with Stillman before his assigned flight. The reinforce-

ment unit of ten ships were to go to the Alaskan Low and assist in bringing down an mP mass that was scheduled to deposit the controversial rainstorms over the intermountain area near the end of June. It was a tremendous mass of air that would cover half the United States at once and deposit millions of tons of water.

Twenty-three ships were already located at the Alaskan Low. The fleet represented every ship that could be spared from Gulf and South Pacific operations.

The first group had been there for four days now, deepening the Low, gaining control over it, and had it already started towards the Pacific Northwest, but more ships would be needed to maneuver it accurately over the continent.

Long hours and days at the controls of the training ships had given Jim skill, but he wished Stillman had been able to assign him to more actual weather flights as trainee before turning over a ship to him. This lack gave him a faint trepidation that he tried to erase with the thought of Stillman's assurance that he was more than capable enough to handle a fight.

The ten ships rose from the great landing port near Weather Central on scheduled time. Rising in the moonlight, they were like silver bubbles slowly ascending in a clear liquid.

On his screen Jim could see others of the flight on either side of him and as they sped far above the plains of the Middlewest he recalled the days when he watched on moonlit nights for the flight of the weather ships and vowed some day he'd fly them. This was the realization of the dream, his first actual weather flight. But somehow there was a flatness to it, an anticlimax formed by the tragic events surrounding Weather Central, the insidious, undetectable campaign of Hydroponics to wipe out the control of weather so that its own food monopoly could be maintained.

Down below, Jim saw the millions of acres of the dirt farmers who depended on Weather Central for surety of production, for their very existence. There were cities in whose industries, utilities, and climate Weather Central was a factor worth millions of dollars to each.

Dotting the country were the establishments of the vast recreation industry whose income had been doubled by the assurances of Weather Central regarding outdoor activities, but which continued to malign the control agency for not giving even more dates and more definite forecasts of fair weather.

Weather Central was the greatest single economic force in the life of the entire nation. But since the first community of man it had been traditional to complain about the weather regardless of its nature.

Now that control of the weather was actually a fact every man felt he was entitled to his own kind of weather when and where he wanted it. And millions were prepared to be antagonistic about the

matter. That was the chief reason why Hydroponics system of opposition had worked so well.

Cities that had prided themselves on national records for days of sunshine made militant demands that their records be upheld. But in many cases they were taken away and given to other cities less suitably located for agriculture that required adequate moisture.

Cities whose boasts had been more wish than fact now were aggrieved that their boasting was not made fact. Suits had been brought against Weather Central for not dispelling the traditional fogs of some of the more blatantly advertised sections of the country.

But Weather Central had no magic imprecation by which the heavens could be reversed in their normal function. The weather always had and always would be dependent upon the movement of air masses over the land and the moisture content of those masses.

Weather Central could not create dry or wet or hot or cold air masses. It could only find them in the factories of weather, the great arctic and antarctic regions, in the moist ocean areas or over the great deserts of the world. Each section of the Earth produced its own type of air masses. Weather Central, bound in scope by international agreements, could only draw upon the products of these great factories and draw the air masses over the continent at approximately the time needed in trajectories that were determined and held to with a remarkable degree of accuracy.

The ten ships of the reinforcement squadron rose to interstellar heights in a long parabola. At its peek Jim could see the crimson line that marked the sunlit atmosphere of Earth. Then the flight started down the long slope towards the ocean off the Canadian Coast.

Jim turned the controls over to automatic after reaching the apex of the curve. He strolled about the control room, checking his trajectory, making conversation with his observer. But his mind was on Pete Carlson and Thomas Wentworth — and Hydroponics. Somehow, Jim knew, there was a connection between the sudden appearance of these accidents and the known hostility of Hydroponics. But where was it?

He felt that he had only seen the beginning of troubles that would press Weather Central into dissolution if they continued, but the one factor that would link up the isolated and seemingly disconnected incidents was missing.

He would bet his life on Pete Carlson's innocence of any connection with Hydroponics. Of Thomas Wentworth he was certain there was a direct relationship—but there was no proof. He was willing to believe Stillman's confident assertion that his own experience at the hotel was the work of Hydroponics' agents.

His mind wrestled with the problem as they dipped below the first ice crystal sheets of cirrus

clouds towards the thick layer of altocumulus being formed in the weak cyclone. Jim switched on the radio aura governing spacing.

He heard the voice of the squadron leader, "Reinforcements reporting."

"Take places," the fleet commander ordered. "Trajectory co-ordinates will be transmitted."

The ships moved smoothly into position. Jim settled his in the outer and higher of the two concentric rings. The slow, cyclonic rotation began to be imparted to the hundreds of tons of air as the ship's tractors went out.

Jim could not see directly beyond the ship any farther than the cloud layer below, but he turned the beams that fed his screens to the surging waters below. White tipped waves were lashing the long coast of Alaska and Canada and raising the surface of the ocean in great, rolling peaks as far south as the Oregon-California line. Below the ceiling of clouds a moderate rain had formed.

They were losing too much precipitation for so early in the flight, Jim thought. His estimate was correct he noted as he saw a moment later from the change in co-ordinates that reduced the pressure gradient of the cyclone and forced the air downward to pick up additional heat adiabatically.

It was far past his time to go off the trick and his relief had been waiting. Jim turned the ship over to him with a nod and left the room for his quarters.

The first intimation of trouble came with the shrill clang of an alarm gong that roused him from slumber. He donned a robe hastily and rushed out towards the control room. All the other technicians off duty were racing down the corridor simultaneously towards the control room and the indicator where a red light flashed on and off, an emergency alarm demanding the attention of every man.

"The trajectory! We're off the co-ordinates!" It was Jim's observer, Alden Oakland, who uttered the exclamation as the motley group burst into the room.

Jim rushed to the automatic course plotter. The pilot on duty was already there and his observer was peering over his shoulder.

On the sheet two divergent lines were slowly crawling across the sheet. One, in black, was the course they should be following according to the co-ordinates being received from Weather Central. Another trace, many minutes of arc away, in red, was the one they were actually on.

Thurlow, the pilot on the trick, looked baffled. "What do you make of it, Jim?"

"The automatics have lost control for some reason, but what about the other ships? Where are they? Have you called the commander?"

"We tried just before the alarm sounded," said Cameron, the observer, "and the beam was dead."

Jim swiftly adjusted the plotter to synchronize with the radio aura spacing the ships. "They're in

formation—and all off the course."

Thurlow had moved away from the plotter to the interphone panel. He looked up as Jim spoke. "The engine room doesn't answer," he said. "I can't raise Jugins and Eberly."

"Get down to the engine room and see why they don't answer," Jim ordered. "Take Cameron with you. We'll try to raise the other ships again."

The relief pilot responded and moved towards the door of the room. He twisted the handle and an expression of ludicrous bewilderment crossed his face.

"It's locked."

The expressions on the faces of the other technicians matched the blankness of Thurlow's. They all moved towards the door except Jim. He remained at the interphone screen staring into the face of Engine Technician Jugins.

"Sorry to have kept you waiting," said Jugins. "I had to make sure the control room door was locked and welded after you all rushed into it so obligingly. What was it you wanted?"

"I was wondering what was the matter with the outside communication circuits, but I think I know now so I won't bother you with it. Where's Eberly?"

"Dead. I had to hit him hard."

Jim's mind was working swiftly in vain, circuitous thought. This was the same pattern, repeated again. Another element, but no connecting link with the previous incidents. Somewhere, somehow there had to be a link—a link all the way to Hydroponics.

There was one, a faint one that made no sense, Jim thought. It was in Jugins' eyes. There was the same light that had been upon Pete Carlson's face before he rammed the neighboring ship. There was the same light of insanity, of fanaticism.

But yet there was a distinct difference. Pete's had been a condition of resigned despondency. Jugins' face held a look of high purpose.

"What do you intend to do? Why are we off course?" asked Jim quietly. By now the others had trailed back from the sealed door and stared unbelievingly at their crazed crewmate.

"Of course I'll tell you," said Jugins. "It is fitting that you should know. Emissary Backwern desired that you should know before annihilation overtook you."

Backwern!

The name joggled through Jim's mind trying to find a slot into which it would fit. Then it slid into place. Backwern was the minister who had protested so loudly against Weather Central's usurpation of the domain of God.

"You did not think that you would be allowed to blaspheme the heavens forever, surely," Jugins chanted. "The inevitable time has come when the Emissaries shall drive you out of existence. When the world sees the ruin of this day you will never be able to interfere again."

"Batty as an old barn," someone

murmured in a whisper of horrified awe. Horror that came with the realization that Jugins was complete master of the ship.

But Jim had turned off the interphone. He faced Thurlow. "You and Cameron run a pair of jumpers from the lighting circuit to the control panel here. Stevens, get to work on that door with anything you can find. Oakland, help me get the cover off this control panel before Jugins has much more time."

Obediently, the men moved away to carry out the orders. But Oakland asked in puzzlement as he removed the panel cover screws, "What's the idea? How are we going to get out of here with that crazy ape running loose outside? He may duck us in the briny if he sees we're breaking out."

Jim answered without looking up, "The manual controls from this board are still functioning as far as I know—"

"Why, then we could get back on the trajectory!"

"And as soon as we tried to move the ship with them Jugins would begin smashing everything in sight to keep us from it. He'd permanently disable the control relays down there in smashing these manuals."

Oakland's exuberance died. "Then how—?"

"Jugins is probably carefully disconnecting these manual circuits right now. It's against regulations to work on the control circuits when they're hot, but we all know it's the custom because their juice load is negligible. I'm trusting Jugins to adhere to custom. We'll connect the lighting circuit to the control leads that are normally open circuited. Jugins is sure to get across some of them—I hope it will get him before the leads burn out."

By the time the panel cover was off, the jumpers were run from the lighting circuit. It was a high amperage line with what Jim believed was sufficient voltage to hit Jugins.

They quickly wired the jumpers in—and then waited.

They had no way of knowing whether Jugins was heading for the bait or not. There was no indication from the behavior of the ship whether or not he had disconnected the panel. But Jim did not dare test the manuals or use the interphone screen for fear the fanatic technician would demolish the circuits and destroy the control relays.

Stevens and three helpers were making slow progress on the tough metal of the door with a small torch. The rest of the crew waited staring at the vision screen that still showed the scene outside the ship. They were far over the water and the waves were white with fury. The ships seemed to be gaining rapidly in circular motion.

The technicians were bewildered, unable to assign a reason to the incredible thing that was happening to them. They wondered if each of the other ships had been

taken over by some fanatic member of the crew. But most of all they wondered what was intended to happen next.

Only Jim November knew that it was a detail in a larger pattern of destruction woven by Hydroponics.

Obviously, they had used Minister Backwern for a program of religious fanataсism to attack Weather Central with the oldest of weapons, superstition. In a world which could control the forces of the air above the Earth such a weapon was still potent.

Apparently in each ship some key member of the technical staff had been influenced to gain control and place the remainder of the crew out of commission—by killing if necessary, as in the case of Eberly.

The immediate objective of this plan remained to be seen, but to Jim November the outline was becoming visible.

"Extrapolate our present trajectory," he ordered Alden Oakland. "Give me some possible contact points with shore."

The observer hunched over the calculator desk adjacent to the plotter. For nearly four hours by cut and try methods he tried to fit a projected course to their present trajectory. At last he tossed the sheets to Jim. "There's a good probability of striking within fifty miles of San Francisco."

Jim nodded. "See what our rotational velocity and pressure gradient are doing?"

"Both rising rapidly. We have a velocity of two hundred and fifty miles an hour now with a gradient of three millibars per sixty miles. The low point is 945 millibars plus or minus five."

"Check. A little more of that and it will turn into a typhoon."

Oakland nodded slowly. The remainder of the technicians were gathered about the pilot's and the computer's positions. They knew the significance of the figures called off by the observer. No weather ship had ever before been involved in such a condition by design. There had been an instance or two of ships being sent into hurricanes to dispel them, but this was the first man-made hurricane.

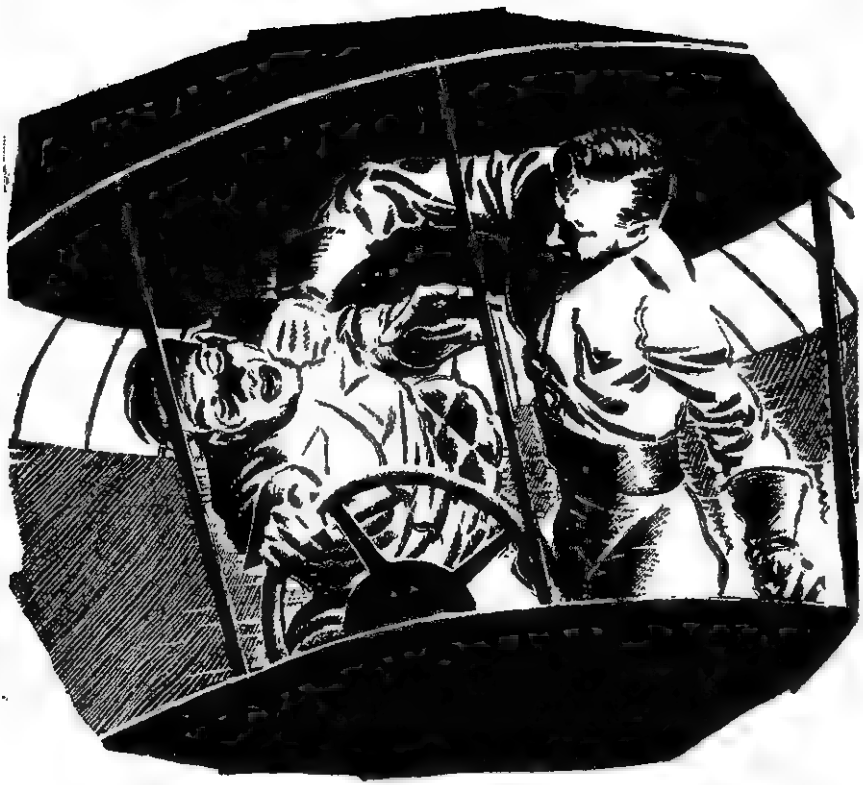
"Our rotational velocities in the lower levels will approach the normal typhoon value of around thirteen hundred miles per hour by the time we strike the California coast," said Jim. "If we hit San Francisco with that—"

The men remained silent, staring at the screen that Jim turned to the long, trailing funnel that was forming below the cloud layer, a black tongue that licked viciously towards the surface of the waters below.

"I don't get it," said Oakland. "That crazy Jugins can't be doing all the dirt. Is there one like him on every ship?"

"I'm afraid there is," said Jim. "but now I think we'd better take the chance of finding out how well our trap worked—if at all."

One by one, he tried the manual controls for speed and direc-



tion, lift and depression. There was no response when he tried to alter the trajectory of the ship horizontally. The last control he touched was the depression control and the ship responded with a definite dip in altitude.

"What does that mean?" asked Oakland.

"I think it means that Jugins nearly had us cut off before we got him. We'll take a look."

He switched on the screen that showed him the scene in the engine room of the ship. The crazed technician lay sprawled over a relay bank, his hands still clutching the now burned out lead.

There was an exultant exclamation from the crew, but Jim dampened it with a nod towards the door. "We aren't any better off than before."

Stevens' crew had been spelled several times and were back again, sweating copiously over the forlorn job of tackling the door with the meager flame of their torch. But Stevens looked up as Jim spoke. "We're almost through," he said.

"I hope you didn't kill Jugins. I'd like to take care of that little detail myself. Burt Eberly was a good buddy of mine."

Jim left the panel and joined Oakland at the plotter. The low was deepening at a terrifying rate. The center was indicated as 870 millibars, but they knew that was meaningless as the waterspout was forming. The gradient at the locus of the ship was increased to three millibars in fifteen miles. Their rotational velocity had risen along an acceleration curve set by Jugins in conformity with the flight of the other ships before his death.

The storm was definitely of typhoon force. The waterspout twisted and gyrated wildly between the ocean surface and the low cloud layer. Its black tongue seemed to lash the water until the sea heaved with pain.

"We're turning in, now," Oakland said. "Our course checks with my extrapolation."

Jim nodded. "It's San Francisco on the nose."

Silently they thought of what it would mean to that metropolis when the storm hit. They pictured it cutting a jagged path of destruction through the familiar streets. Its black, spinning tongue, whining and groaning with thunder, would make a swath of rubble down the length of Market Street. It would whip the Bay to fury and sweep on through Oakland. It would suck Lake Merritt dry in a single gulp and ride on through the hills above the city.

But there was no reason it should end there. Fed by the atomic energies in the motors of the weather ships, the destruction could sweep the entire length of the continent, not only once, but it could ride back and forth endlessly tearing and uprooting with screaming winds and rain that would incite the populace to eternal banishment of Weather Central.

"We're through!"

Jim turned in time to hear Stevens' exultant announcement and see him crash the door open. The crew burst out into the corridor and into the engine room.

With scarcely a glance at Jugins, except to move the fanatic's corpse from the relay rack, they surveyed the damage and the change in the control circuits.

"We can regain control of this ship and move out of the storm system in a few minutes," said Oakland, "but what about the other ships? How can we help them? Do you think it would do any good to try to communicate?"

Jim November shook his head slowly and pointed towards the air-conditioning equipment. "The attackers on the other ships have no doubt succeeded in doing what Jugins planned here."

Oakland strode over to examine a small apparatus placed near an opened blower channel. "A cyanide generator! He probably had the duct opened and ready before he took over, then he decided he'd better cut the manual out before giving us the gas."

Jim nodded. "So our job is to

destroy the other ships, rather than save them. We can't ask for help, either. There aren't any other ships close enough to reach us before this thing moves inland."

"How can we fight them? We aren't built for that. We haven't any weapons."

"But I've got an idea— Let's get above the higher circle, close to one of the ships. Then focus our control on the ship. Adjust to repulsion at full power and see what happens."

Instantly, Oakland sensed the strategy of the move and went to the local control board of the engine room. He moved the sphere up and out of the circle of destroying ships. With careful touch he jockeyed the ship above one of its mates as the two sped in a circle at more than seven hundred miles an hour.

"Now!" Jim exclaimed.

Oakland pressed the control that poured all the energies of the ship's motors into the repelling beam. Their own ship drove into the tropopause, but the repulsor crashed down upon the other one like some cosmic power hammer.

Half the hull shell collapsed before the inertia of the stricken ship was overcome. It drove down in a long arc to the turbulent sea. On the screen the crew watched it crash and sink.

Beads of sweat stood out on the observer's brow. "That's too easy. This stuff makes a potent weapon. But what if some of the boys got away like we did—? How do we know—?

Jim shook his head grimly. "If any of them got away they'd be cutting loose by now as we have done. The mere fact that they haven't shows that they are not alive to do so. Take the next ship."

Assigning his assistant to control of the ship, Jim November tried to bring up from his subconscious the reasoning he had been following there concerning Hydroponics' attacks.

There was a similarity between Thomas Wentworth's failure and Pete Carlson's mental despondency and Jugins' fanaticism. It was all representative of mental unbalance —and that was even the basis of the attack when Jim was taken from the hotel room.

Mental aberrations—the common factor in all attacks on Weather Central so far. That crystallization of thought was the nucleus of what he had been searching for.

It came with such sudden clarity that it dazed him with its incredibility—the incredibility of the only logical and now obvious conclusion that was open to him. There was only one man who could employ such an instrumentality of attack in the entire organization of Weather Central.

He turned to the communication panel of the engine room and switched to Weather Central's clear channel. The image of the switchboard girl appeared.

"Get me Stillman, quick. This is Jim November, weather pilot."

"I'm sorry . . . Mr. Stillman is—"

"Get me Stillman!"

"Oh! You're on the West Coast. *He's* been trying to get *you.*"

The girl's startled features disappeared and the chief forecaster's image appeared an instant later.

"Jim! What's happened out there? We've tried to raise the ships for the last five hours. Reports of hell being loose have come in from all the shipping between the United States and China. What's the matter?"

"Get Winters. I'll explain later. He's your man. He's back of all the trouble we've had in the Central. He's back of this storm. Hydro's controlling him. Get him."

But Stillman didn't answer. A slow look of horror that Jim didn't understand crossed the forecaster's face. There was silence for an instant.

Then Jim cursed himself mentally and violently. He might have known. Winters was almost constantly in Stillman's company like a human leech. He was in Stillman's office now—out of range of the communicator.

Slowly, a gun barrel aimed at Stillman came into the picture and Winters' soft voice was heard. "It's too bad your little detective succeeded in his amateur detecting, but we have provided for such an emergency. He will be taken care of presently. Now, for you—"

Jim saw Stillman's eyes go wide and then the forecaster tried to leap aside as a shot exploded in the room. Stillman's body flexed and crumpled. There was a shattering sound as Winters smashed the communicator and the screen aboard the ship went dark.

Jim did not call back to Weather Central. The switchboard girl would be sending out an alarm because she had a monitor circuit on the long-range call to check synchronization. Any interference from Jim would be no more than interference now.

His cursings grew voluble and he turned to Alden Oakland. The observer had put the ship above another of the enemy spheres. He dropped to within a hundred feet and jockeyed for an accurate alignment of the propulsion beam. He paused a moment as the two ships came sharply into line, then he pressed the control.

They darted towards the stratosphere and the enemy ship crumpled and dove.

But before it hit the water the men of Weather Central watched it blossom suddenly into flame.

"Explosion!" the observer exclaimed in mystification. "What could have caused that? There's nothing—"

"I think that's what Winters meant," said Jim slowly, "when he said we'd be taken care of. I'll bet every one of these ships is secretly mined to blow up when they've completed the job for Hydro. Thurlow! Get all the rest

of the men and begin searching the ship for hidden explosives. Watch for trick detonators and time circuits. Oakland, you and I will start throwing repulsors at the ships as fast as possible. Use the regular unit. I'll cut in with the auxiliary. Use any angle possible. If we hit them hard enough, it looks as if we can set off the explosives."

The men hastened to obey orders. Jim and his observer turned to their control posts.

Oakland gave an exclamation. "There's one above us! He's trying to give us the same works."

"Let him have it!"

Simultaneously, the two units of propulsion repellors hit the enemy sphere as he tried to jockey over the ship. He bounded into the heavens and burst into flame.

But their own ship plunged towards the sea under the mighty recoil of those repellors. On the vision plates the image of the white sea foam grew with perilous clarity.

"Cut north!" Jim commanded. "Forty degrees."

In unison with him, Oakland slanted the beam towards Earth and the ship swung off in a long, but still falling curve. A strain of collapsing proportions was thrust upon the motor beams of the ship's skeleton.

Jim thought he could almost hear the great frame members cracking under the tremendous load of both repellors. But the angle was still not great enough. Their present trajectory would bring them beneath the surface of the water.

"Forty-five degrees," he called.

The repellors turned more directly downward and somewhere there sounded the shrill scream of a collapsing frame member. Tense, Jim held to the course and waited for the ship to crumple and enfold them like a smashed tin can. But the remaining structure held. Jim began to breathe more easily when Oakland cried out.

"We're going to hit!"

The sphere touched the surface of the water. The hull rolled crazily and the inertia controls were thrown out of balance for an instant.

The engine room floor tipped and threw the men against the panels and rolled them across the floor. Then, abruptly, it was quiet and the room was stable once more.

Jim rose and shook himself. Oakland leaned dizzily against the board, half stunned by his fall.

"Where are we? Under water?"

Jim moved to the vision panel without answer and refocused it. Above him were the stars and below there floated a white, violent sea. But it was a sea of clouds and not the lashing Pacific waters.

"We'll stay above them after this," he breathed. "Way above them."

There was not time now to think of Stillman. There was little doubt that the forecaster was dead. All that could be done was no doubt being done to apprehend Winters.

Again Jim November cursed his own stupidity in not putting the puzzle together earlier and of not taking precautions in informing Stillman.

But there was no time for self imprecations. The storm system was less than a hundred miles from the coastline and headed directly for the city of San Francisco.

All gradient values and pressure indications of the low were meaningless now. No actual measurement of the pressure at the exact center of a typhoon or tornado twister had ever been made.

The darkening sky was like a backdrop for a scene from some alien and fearsome planet, and the moving, twisting column of water and air was like a lone and ghastly inhabitant of that planet. It moved relentlessly with blind purpose, guided and fed by the spinning globes in the sky. Globes driven by madmen.

"Ships eight and twenty-one seem to be in trouble," said Oakland, "They've left formation."

"After us?"

"No."

Jim stepped closer and saw the two ships wobbling erratically out of line. Number eight shot out at a tangential course and fell to the sea.

"Inertia control must have given way completely," said Jim. "I wouldn't be surprised if more of them fail at these velocities. Let's go back down. We've got to get them before they hit shore. The system may dissipate with the ships out of it."

They swung the ship down towards the next wary sphere. The fanatic operators had seen the previous maneuvers, but the men of Weather Central followed relentlessly.

They entered upon a mad routine of wildly darting through the skies, stabbing out with the repellors and shooting off at a new angle dictated by the recoil of their forces.

The enemy ships went down one by one. Some exploded. Others were forced into the sea. Two failed from internal causes. The last four gave up completely and fled the scene when they saw the destruction of their companions.

Against pilots of their own skill, Jim November and Alden Oakland knew they would have had no chance to survive such a battle. But the fanatic agents of Hydroponics aboard the other ships were not pilots. They were merely fanatics with minor technical skills and they went down before the darting sphere like sitting ducks.

With the fleeing of the last four the men of Weather Central were left alone in the swirling typhoon that drove unyieldingly towards the great coastal cities.

Jim was at the indicators and Oakland asked, "Is there any chance of its breaking up—any chance at all?"

Jim shook his head slowly. "I'm afraid they've done what they set out to do. There's not a thing we can do to dissipate it or prevent it from going inland. Even if we could get other ships here in time, Weather Central doesn't have

enough to dissipate the thing until it begins to run out because of its own disintegration. It's going inland, and there's not a thing we can do about it."

There had been no report from Thurlow and his crew of searchers. But that danger had faded into insignificance. Jim knew that Weather Central was gone now. Once this twister struck the city public opinion would demand the abandonment of weather control forever.

The two men in the engine room carried out repeated extrapolations attempting to determine as accurately as possible the exact point at which the storm would strike. Hydroponics' agents had planned with devilish accuracy. The storm track would pass over the most densely inhabited portions of the city.

"Shouldn't we have warned them?" Alden Oakland finally said.

"What good would it have done? How far could they have fled from this thing? We couldn't even tell them which way to run."

"I don't know. It seems we ought to be doing something. I wonder when the mined charges are set to go off. Winters must have wanted no one left to tell tales."

Jim knew they were just talking to preserve their own stability but he kept up the meaningless chatter. "If only this thing were headed farther north, beyond the city, or at least the most dense part of it—"

His observer straightened. "No, look. To the south would be better. There's a lot of building area, but it's mostly composed of Hydro's tank farms. The population density is smallest there."

Something clicked within Jim's brain. The irony of the storm's nearness to Hydro's millions of dollars worth of tank farms that fed the vast city area of San Francisco Bay.

"Oakland! Get on that emergency repellor and synchronize it with the regular drive. We can't dissipate this thing or keep it from going inland—but maybe we can steer it!"

For a moment the observer stood immobile, uncomprehending, then he leaped to the controls as the miracle of the possible reprieve revealed itself to him. "I've got you. Give me your settings."

Swiftly, Jim calculated the trajectory which would take the twister over the vast tank farms of Hydro south of the city area. He coordinated it with the forces acting within the storm system and the maximum possible force of their single ship. He dictated his figures to Oakland.

The storm was almost upon the city. The black spinning column of the waterspout had raised a tidal wave that already had swamped shipping and beach property. The life of the city was petrified in terror at the unprecedented monster that rose out of the sea. They didn't know it would strike the city and prayed that it would turn aside. Only two men in a tiny silver globe knew that it would strike somewhere in that city.

Even to Jim it seemed impossible

to suppose the relatively diminutive force of their single ship could deflect that terrible mass of whirling air and water.

He watched their course as it was slowly inscribed on the plotter. "It's not enough! We're hitting!"

He made a rapid recomputation and altered their forces. But already the tongue of the waterspout had touched the beach. As if a charge of explosive had been touched off beneath them, buildings exploded and their debris hurled into the air, mingling a moment with the mighty forces of the typhoon and then dropped to earth. A welter of broken wooden beach homes and buildings remained to mark the twister's path.

Jim closed his eyes against the wreckage and wished momentarily that the explosives within their ship would go off, but Oakland was staring at the plate.

"Jim. We're turning! Check the plotter."

Jim November stared at the curve. It was true. Almost imperceptibly but nevertheless certainly they were overcoming the inertia of that vast air mass. It was swinging south.

South towards Hydro's tank farms.

It seemed like an eternity that they watched the trajectory change, but it was only a matter of instants. The tremendous speed of the advance of the twister and their own rotational velocity of thirteen hundred miles an hour gave no time for long contemplation of events and factors, but the strain in their minds lengthened the fractions of time.

Then they were over the tank farms. The tip of the twister's tongue touched the edge of the vast structures and the tremendous semi-vacuum over the inclosed tanks burst them like paper bags.

Sheets of metal tore from the roofs below and were followed by a fountain of water that drained the tanks and showered half grown produce over dozens of square miles.

"This is it," said Jim. "They ordered it and now they're going to take the medicine."

"What do you mean? What are you talking about?"

Briefly, Jim told him of Hydro's part in the events of the past days and the connection with Winters.

Alden Oakland whistled softly. "If only we could take this tornado across every tank farm Hydro owns—"

"We can't but we can take it across every one that's in our path until the thing dissipates. Watch those controls. We're wavering."

It was a matter of tremendously delicate balance to keep the force of the constantly spinning ship exerted in a given direction on the twister. It was a job that only the automatics could accomplish—after the adjustment had been made for the proper co-ordinates.

Jim watched as the last shred of debris lifted from Hydro's structure and fell back upon the ruin. Then the black tongue was licking out over the Bay and a waterspout lifted to the sky again.

Population density was light in the area on the opposite Bay shore, but destruction was inevitable. A swath of ruin cut through suburban homes and stores and raced on into the east. It swept up again into the Livermore hills and sped for a path that would bypass Sacramento by a narrow margin. Jim stepped to the communication panel and began sending out warnings now that he could determine the path with reasonable accuracy.

The storm, a tornado now, gave no evidence of dissipating. Like some insatiable monster it seemed to feed upon the very structure of the air mass surrounding it and grow rather than diminish in intensity.

But Jim felt a relaxed sense when they were past the Bay area. There was time to plot and time to gain better control over their trajectory.

Then he was roused to a new level of tenseness by a burst from the ship's phone. It was the voice of Thurlow.

"Jim! We've found it! There's a whole string of charges planted near the outer shell. We've got to land and get out of here. There's not time to—"

His voice was cut off by the sudden thunder of an explosion that poured a deafening volume of sound through the resonant hull. The ship rocked and the inertia controls wavered, flinging the men in the room against the panel.

"Thurlow!" Jim cried. "Are you all right? What happened?"

There was silence, then Thurlow's pained voice. "Yeah, I'm all right. It almost got us. Cameron found the time mechanism and cut the circuit to the remaining charges. It got him, though."

"Damage?"

"Possibly a tenth of the skin area gone. Can you still navigate?"

Ten percent of their meager hold upon the storm taken away. And a broken main frame member. Jim knew it would be decisive. "We can navigate," he said. "Come down when you're through."

He recomputed his forces and the trajectory towards Sacramento. In the Sacramento Valley was the largest of Hydro's vast Pacific system. Food production for forty million people. He pondered the scale of balances.

The greatest index of social responsibility of any pilot they had, Stillman had said. Here it was. Which was the most important—the safety of the city, the risk of serious food shortage, the possibility of striking a decisive blow at Hydroponics—?

Hydro had to go, he knew. It was the old story of an old, established giant of commercialism blundering ahead in the narrow path of progress, blocking the fleeter, more infant forms of innovation that must some day grow to replace the ancient ways.

Hydroponics had served civilization well for its duration of reign, but the time had come for another old to be replaced by another new.

The decision would not be so hard, after all.

He checked the trajectory. The

path of the tornado lay straight across the Sacramento Valley, across the vast tank farms that served the entire mid-Pacific Coast. There would be temporary famine and turmoil and perhaps Weather Central would be blamed—but it was the only way.

Jim turned again to the communication panel and called Weather Central. He asked for Donovan, Executive Head of the Central.

Donovan's face was calm amid news that must have shaken his world like the tornado that Jim November rode.

"Weather ship pilot Jim November. I am calling to report that the tornado moving in from the Pacific Coast is not dissipating. We have power only to alter its trajectory slightly through a steering control. It will pass over Hydro's farms in Sacramento Valley.

"Will you tell me what happened to Forecaster Stillman and Dr. Winters?"

"Stillman is alive and expected to recover, though in very critical condition at present. Winters was captured and subjected to an intensive psycho-examination. He managed to commit suicide shortly afterwards, but we have a record that will stand up legally and gives full information on Hydro's action in this plot. It will be made public.

"As to the tornado: Are you certain there is nothing to be done?"

"Nothing during whatever length of time it will take to break up another formation and send us a minimum force of fifteen ships. I believe they could break it up when it gets into the mountains. But nothing can be done before Hydro's tank farms are destroyed."

Donovan decided instantly. "We'll break up the present Gulf formation and send you twelve ships. That will have to accomplish the task. I assign you in charge of the action. Report when necessary."

Donovan switched off and a swelling exultation filled Jim November. The record of Winters' mind would be made public. The story of how he had undermined Weather Central by allowing men with mental disturbances to occupy key positions would clear the Central and it would be Hydro that public opinion would condemn, not the Central.

They were coming over the Sacramento Valley now. The tornado was reaching for Hydro's tanks with its tongue of black destruction.

Another old was giving way to another new.

THE END.

IN TIMES TO COME

Stories of science fiction based on meteorology are actually relatively few and far between; Ray Jones' discussion of what happens when you can control weather, but not "people's 'pinions" about what weather should be, is told in this issue.

Next month, Hal Clement—whose major interest is astronomy, but who was, during the past couple of years, in very intimate contact with meteorology—tells a story of weather control from a different angle. Actually, it's a story of a salesman, in an era which will, most certainly, be the heyday of the sales engineer. In a period of galactic expansion of empire, the trader is apt to be the prime agency of interstellar exploration.

The salesmen will have to be a highly trained group, too—a lot of things will be required of a man who is to make contact with an unknown race, find their problems, their exportable surpluses, and convince them that the company he represents can solve or ameliorate those problems in return for that exportable surplus. It'll take understanding of languages, of alien psychologists, of industrial and economic possibilities. The Master Salesman will need a backing staff of engineers, economists, experts of different kinds.

The Master Salesman of this particular story found a problem; perfectly terrible weather. His company produced the giant machinery that might be used to modify a planet's weather. But—he overlooked one item. He was having trouble with a cold front, but one of a type even the advanced science of his day had never attempted to consider—

Hal Clement tells me, incidentally, that much of this yarn was plotted while he was having troubles with cold fronts, hot Nazi ack-ack, and the controls of a Liberator during the last days of Nazi Germany.

THE EDITOR.

THE ANALYTICAL LABORATORY

There were seven stories to be voted on in the March issue of Astounding Science-Fiction; the natural result is that all the point scores run higher. The final results are:

Place	Story	Author	Points
1.	A Logic Named Joe	Will F. Jenkins	2.80
2.	Pattern for Conquest (Pt. 1)	George O. Smith	3.30
3.	We Kill People	Lewis Padgett	4.00
4.	Adapter	Murray Leinster	4.06
5.	Lady Dog	A. Bertram Chandler	4.41

One thing of interest is that Will Jenkins' short story beat out the novel for first place; since novels give an author so much greater scope for development, Jenkins did right well to take first. "We Kill People" and "Adapter" are practically a tie—a difference in the third significant figure—and G. N. Howard's "Depth," with 4.61 points might be called fifth.

THE EDITOR.

Paradise

by CLIFFORD D. SIMAK

The Mutants had solved the secret of the philosophy that would give men peace—but the man who returned from Jupiter offered Paradise with a price tag; the oblivion of mankind.

Illustrated by Swenson

The dome was a squatted, alien shape that did not belong beneath the purple mist of Jupiter, a huddled, frightened structure that seemed to cower against the massive planet.

The creature that had been Kent Fowler stood spraddling on his thick-set legs.

An alien thing, he thought. That's how far I've left the human race. For it's not alien at all. Not alien to me. It is the place I lived in, dreamed in, planned in. It is the place I left—afraid. And it is the place I come back to—driven and afraid.

Driven by the memory of the people who were like me before I became the thing I am, before I knew the liveness and the fitness and the pleasure that is possible if one is not a human being.

Towser stirred beside him and Fowler sensed the bumbling friendliness of the one-time dog, the

expressed friendliness and comradeship and love that had existed all the time, perhaps, but was never known so long as they were dog and man.

The dog's thoughts seeped into his brain. "You can't do it, pal," said Towser.

Fowler's answer was almost a wail. "But I have to, Towser. That's what I went out for. To find what Jupiter really is like. And now I can tell them, now I can bring them word."

You should have done it long ago, said a voice deep inside of him, a faint, far-off human voice that struggled up through his Jovian self. *But you were a coward and you put it off—and put it off. You ran away because you were afraid to go back. Afraid to be turned into a man again.*

"I'll be lonesome," said Towser, and yet he did not say it. At least there were no words—rather a feeling of loneliness, a heart-wrench cry at parting. As if, for the moment, Fowler had moved over and shared Towser's mind.

Fowler stood silent, revulsion growing in him. Revulsion at the thought of being turned back into a man—into the inadequacy that was the human body and the human mind.

"I'd come with you," Towser told him, "but I couldn't stand it. I might die before I could get back. I was darn near done for, you remember. I was old and full of fleas. My teeth were wore right down to nubbins and my digestion was all shot. And I had terrible dreams. Used to chase rabbits when I was a pup, but toward the last it was the rabbits that were chasing me."

"You stay here," said Fowler. "I'll be coming back."

If I can make them understand, he thought. *If I only can. If I can explain.*

He lifted his massive head and stared at the lift of hills which swelled to mountain peaks shrouded in the rose and purple mist. A lightning bolt snaked across the sky and the clouds and mist were lighted with a fire of ecstasy.

He shambled forward, slowly, reluctantly. A whiff of scent came down the breeze and his body drank it in—like a cat rolling in catnip. And yet it wasn't scent—although that was the closest he could come to it, the nearest word he had. In years to come the human race would develop a new terminology.

How could one, he wondered, explain the mist that drifted on the land and the scent that was pure delight. Other things they'd understand, he knew. That one never had to eat, that one never slept, that one was done with the whole range of depressive neurosis of which Man was victim. Those things they would understand, because they were things that could be told in simple terms, things which could be explained in existent language.

But what about the other things—the factors that called for a new vocabulary? The emotions that

Man had never known. The abilities that Man had never dreamed of. The clarity of mind and the understanding—the ability to use one's brain down to the ultimate cell. The things one knew and could do instinctively that Man could never do because his body did not carry the senses with which they could be done.

"I'll write it down," he told himself. "I'll take my time and write it down."

But the written word, he realized, was a sorry tool.

A televisor port bulged out of the crystalline hide of the dome and he shambled toward it. Rivulets of condensed mist ran down across it and he reared up to stare straight into the port.

Not that he could see anything, but the men inside would see him. The men who always watched, staring out at the brutality of Jupiter, the roaring gales and ammonia rains, the drifting clouds of deadly methane scudding past. For that was the way that men saw Jupiter.

He lifted a forepaw and wrote swiftly in the wetness on the port—printing backwards.

They had to know who it was, so there would be no mistake. They had to know what coordinates to use. Otherwise they might convert him back into the wrong body, use the wrong matrix and he would come out somebody else—young Allen, maybe, or Smith, or Pelletier. And that might well be fatal.

The ammonia ran down and blurred the printing, wiped it out. He wrote the name again.

They would understand that name. They would know that one of the men who had been converted into a Loper had come back to report.

He dropped to the ground and whirled around, staring at the door which led into the converter unit. The door moved slowly, swinging outward.

"Good-by, Towser," said Fowler, softly.

A warning cry rose in his brain: *It's not too late. You aren't in there yet. You still can change your mind. You still can turn and run.*

He plodded on, determined, gritting mental teeth. He felt the metal floor underneath his pads, sensed the closing of the door behind him. He caught one last, fragmentary thought from Towser and then there was only darkness.

The conversion chamber lay just ahead and he moved up the sloping ramp to reach it.

A man and dog went out, he thought, and now the man comes back.

The press conference had gone well. There had been satisfactory things to report.

Yes, Tyler Webster told the newsmen, the trouble on Venus had been all smoothed out. Just a matter of the parties involved sitting down and talking. The life experiments out in the cold laboratories of Pluto were progressing

satisfactorily. The expedition for Centauri would leave as scheduled, despite reports it was all balled up. The trade commission soon would issue new monetary schedules on various interplanetary products, ironing out a few inequalities.

Nothing sensational. Nothing to make headlines. Nothing to lead off the newscast.

"And Jon Culver tells me," said Webster, "to remind you gentlemen that today is the one hundred twenty-fifth anniversary of the last murder committed in the Solar System. One hundred and twenty-five years without a death by premeditated violence."

He leaned back in the chair and grinned at them, masking the thing he dreaded, the question that he knew would come.

But they were not ready to ask it yet—there was a custom to be observed—a very pleasant custom.

Burly Stephen Andrews, press chief for *Interplanetary News*, cleared his throat as if about to make an important announcement, asked with what amounted to mock gravity:

"And how's the boy?"

A smile broke across Webster's face. "I'm going home for the week-end," he said. "I bought my son a toy."

He reached out, lifted the little tube from off the desk.

"An old-fashioned toy," he said. "Guaranteed old-fashioned. A company just started putting them out. You put it up to your eye and turn it and you see pretty pictures. Colored glass falling into place. There's a name for it—"

"Kaleidoscope," said one of the newsmen, quickly. "I've read about them. In an old history on the manners and customs of the early twentieth century."

"Have you tried it, Mr. Chairman?" asked Andrews.

"No," said Webster. "To tell the truth, I haven't. I just got it this afternoon and I've been too busy."

"Where'd you get it, Mr. Chairman?" asked a voice. "I got to get one of those for my own kid."

"At the shop just around the corner. The toy shop, you know. They just came in today."

Now, Webster knew, was the time for them to go. A little bit of pleasant, friendly banter and they'd get up and leave.

But they weren't leaving—and he knew they weren't. He knew it by the sudden hush and the papers that rattled quickly to cover up the hush.

Then Stephen Andrews was asking the question that Webster had dreaded. For a moment Webster was grateful that Andrews should be the one to ask it. Andrews had been friendly, generally speaking, and *Interplanetary Press* dealt in objective news, with none of the sly slanting of words employed by interpretative writers.

"Mr. Chairman," said Andrews, "we understand a man who was converted on Jupiter has come back to Earth. We would like to ask you if the report is true?"

"It is true," said Webster, stiffly.

They waited and Webster waited, unmoving in his chair.

"Would you wish to comment?" asked Andrews, finally.

"No," said Webster.

Webster glanced around the room, ticking off the faces. Tensed faces, sensing some of the truth beneath his flat refusal to discuss the matter. Amused faces, masking brains that even now were thinking how they might twist the few words he had spoken. Angry faces that would write outraged interpretative pieces about the people's right to know.

"I am sorry, gentlemen," said Webster.

Andrews rose heavily from the chair. "Thank you, Mr. Chairman," he said.

Webster sat in his chair and watched them go, felt the coldness and emptiness of the room when they were gone.

They'll crucify me, he thought. *They'll nail me to the barn door and I haven't got a comeback. Not a single one.*

He rose from the chair and walked across the room, stood staring out the window at the garden in the sun of afternoon.

Yet, you simply couldn't tell them.

Paradise! Heaven for the asking! And the end of humanity! The end of all the ideals and all the dreams of mankind, the end of the race itself.

The green light on his desk flashed and chirped and he strode back across the room.

"What is it?" he asked.

The tiny screen flashed and a face was there.

"The dogs just reported, sir, that Joe, the mutant, went to your residence and Jenkins let him in."

"Joe! You're sure?"

"That's what the dogs said. And the dogs are never wrong."

"No," said Webster slowly, "no, they never are."

The face faded from the screen and Webster sat down heavily.

He reached with numbed fingers for the control panel on his desk, twirled the combination without looking.

The house loomed on the screen, the house in North America that crouched on the windy hilltop. A structure that had stood for almost a thousand years. A place where a long line of Websters had lived and dreamed and died.

Far in the blue above the house a crow was flying and Webster heard, or imagined that he heard, the wind-blown *caw* of the soaring bird.

Everything was all right—or seemed to be. The house drowsed in the morning light and the statue still stood upon the sweep of lawn —the statue of that long-gone ancestor who had vanished on the star-path. Allen Webster, who had been the first to leave the Solar System, heading for Centauri—even as the expedition now on Mars would head out in a day or two.

There was no stir about the

house, no sign of any moving thing.

Webster's hand moved out and flipped a toggle. The screen went dead.

Jenkins can handle things, he thought. *Probably better than a man could handle them. After all, he's got almost a thousand years of wisdom packed in that metal hide of his. He'll be calling in before long to let me know what it's all about.*

His hand reached out, set up another combination.

He waited for long seconds before the face came on the screen.

"What is it, Tyler?" asked the face.

"Just got a report that Joe—"

Jon Culver nodded. "I just got it, too. I'm checking up."

"What do you make of it?"

The face of the World Security chief crinkled quizzically. "Softening up, maybe. We've been pushing Joe and the other mutants pretty hard. The dogs have done a top-notch job."

"But there have been no signs of it," protested Webster. "Nothing in the records to indicate any trend that way."

"Look," said Culver. "They haven't drawn a breath for more than a hundred years we haven't known about. Got everything they've done down on tape in black and white. Every move they've made, we've blocked. At first they figured it was just tough luck, but now they know it isn't. Maybe they've up and decided they are licked."

"I don't think so," said Webster, solemnly. "Whenever those babies figure they're licked, you better start looking for a place that's soft to light."

"I'll keep on top of it," Culver told him. "I'll keep you posted."

The plate faded and was a square of glass. Webster stared at it moodily.

The mutants weren't licked—not by a long shot. He knew that, and so did Culver. And yet—

Why had Joe gone to Jenkins? Why hadn't he contacted the government here in Geneva? Face saving, maybe. Dealing through a robot. After all, Joe had known Jenkins for a long, long time.

Unaccountably, Webster felt a surge of pride. Pride that if such were the case, Joe had gone to Jenkins. For Jenkins, despite his metal hide, was a Webster, too.

Pride, thought Webster. *Accomplishment and mistake. But always counting for something. Each of them down the years. Jerome, who had lost the world the Juwain philosophy. And Thomas, who had given the world the space-drive principle that now had been perfected. And Thomas' son, Allen, who had tried for the stars and failed. And Bruce, who had first conceived the twin civilization of man and dog. Now, finally, himself—Tyler Webster, chairman of the World Committee.*

Sitting at the desk, he clasped his hands in front of him, stared at the evening light pouring through the window.

Waiting, he confessed. Waiting for the snicker of the signal that would tell him Jenkins was calling to report on Joe. If only—

If only an understanding could be reached. If only mutants and men could work together. If they could forget this half-hidden war of stalemate, they could go far, the three of them together—man and dog and mutant.

Webster shook his head. It was too much to expect. The difference was too great, the breach too wide. Suspicion on the part of men and a tolerant amusement on the part of the mutants would keep the two apart. For the mutants were a different race, an offshoot that had jumped too far ahead. Men who had become true individuals with no need of society, no need of human approval, utterly lacking in the hard instinct that had held the race together, immune to social pressures.

And because of the mutants the little group of mutated dogs so far had been of little practical use to their older brother, man. For the dogs had watched for more than a hundred years, had been the police force that kept the human mutants under observation.

Webster slid back his chair, opened a desk drawer, took out a sheaf of papers.

One eye on the televisor plate, he snapped over the toggle that called his secretary.

"Yes, Mr. Webster."

"I'm going to call on Mr. Fowler," said Webster. "If a call comes through—"

The secretary's voice shook just a little. "If one does, sir, I'll contact you right away."

"Thanks," said Webster.

He snapped the toggle back.

They've heard of it already, he thought. *Everyone in the whole building is standing around with their tongues hanging out, waiting for the news.*

Kent Fowler lounged in a chair in the garden outside his room, watching the little black terrier dig frantically after an imagined rabbit.

"You know, Rover," said Fowler, "you aren't fooling me."

The dog stopped digging, looked over his shoulder with grinning teeth, barked excitedly. Then went back to digging.

"You'll slip up one of these days," Fowler told him, "and say a word or two and I'll have you dead to rights."

Rover went on digging.

Foxy little devil, thought Fowler. *Smarter than a whip. Webster sicked him on me and he's played the part, all right. He's dug for rabbits and he's been disrespectful to the shrubs and he's scratched for fleas—the perfect picture of a perfect dog. But I'm on to him. I'm on to all of them.*

A foot crunched in the grass and Fowler looked up.

"Good evening," said Tyler Webster.

"I've been wondering when you'd come," said Fowler shortly. "Sit down and give it to me—

straight. You don't believe me, do you?"

Webster eased himself into the second chair, laid the sheaf of papers in his lap.

"I can understand how you feel," he said.

"I doubt if you can," snapped Fowler. "I came here, bringing news that I thought was important. A report that had cost me more than you can imagine."

He hunched forward in his chair. "I wonder if you can realize that every hour I've spent as a human being has been mental torture."

"I'm sorry," said Webster. "But we had to be sure. We had to check your reports."

"And make certain tests?"

Webster nodded.

"Like Rover over there?"

"His name isn't Rover," said Webster, gently. "If you've been calling him that, you've hurt his feelings. All the dogs have human names. This one's Elmer."

Elmer had stopped his digging, was trotting toward them. He sat down beside Webster's chair, scrubbed at his dirt-filled whiskers with a clay-smeared paw.

"What about it, Elmer?" asked Webster.

"He's human, all right," said the dog, "but not all human. Not a mutant, you know. But something else. Something alien."

"That's to be expected," said Fowler. "I was a Loper for five years."

Webster nodded. "You'd retain part of the personality. That's understandable. And the dog would spot it. They're sensitive to things like that. Psychic, almost. That's why we put them on the mutants. They can sniff one out no matter where he is."

"You mean that you believe me?"

Webster rustled the papers in his lap, smoothed them out with a careful hand. "I'm afraid I do."

"Why afraid?"

"Because," Webster told him, "you're the greatest threat mankind's ever faced."

"Threat! Man, don't you understand? I'm offering you . . . offering you—"

"Yes, I know," said Webster. "The word is Paradise."

"And you're afraid of that?"

"Terrified," said Webster. "Just try to envision what it would mean if we told the people and the people all believed. Everyone would want to go to Jupiter and become a Loper. The very fact that the Lopers apparently have life spans running into thousands of years would be reason enough if there were no others.

"We would be faced by a system-wide demand that everyone immediately be sent to Jupiter. No one would want to remain human. In the end there would be no humans—all the humans would be Lopers. Had you thought of that?"

Fowler licked his lips with a nervous tongue. "Certainly. That is what I had expected."

"The human race would disappear," said Webster, speaking

evenly. "It would be wiped out. It would junk all the progress it has made over thousands of years. It would disappear just when it is on the verge of its greatest advancement."

"But you don't know," protested Fowler. "You can't know. You've never been a Loper. I have." He tapped his chest. "I know what it's like."

Webster shook his head. "I'm not arguing on that score. I'm ready to concede that it may be better to be a Loper than a human. What I can't concede is that we would be justified in wiping out the human race—that we should trade what the human race has done and will do for what the Lopers might do. The human race is going places. Maybe not so pleasantly nor so clear-headedly nor as brilliantly as your Lopers, but in the long run I have a feeling that it will go much farther. We have a racial heritage and a racial destiny that we can't throw away."

Fowler leaned forward in his chair. "Look," he said, "I've played this fair. I came straight to you and the World Committee. I could have told the press and radio and forced your hand, but I didn't do it."

"What you're getting at," suggested Webster, "is that the World Committee doesn't have the right to decide this thing themselves. You're suggesting that the people have their say about it."

Fowler nodded, tight-lipped.

"Frankly," said Webster, "I don't trust the people. You'd get mob reaction. Selfish response. Not a one of them would think about the race, but only of themself."

"Are you telling me," asked Fowler, "that I'm right, but you can't do a thing about it?"

"Not exactly. We'll have to work out something. Maybe Jupiter could be made a sort of old folks' home. After a man had lived out a useful life—"

Fowler made a tearing sound of disgust deep inside his throat. "A reward," he snapped. "Turning an old horse out to pasture. Paradise by special dispensation."

"That way," Webster pointed out, "we'd save the human race and still have Jupiter."

Fowler came to his feet in a swift, lithe motion. "I'm sick of it," he shouted. "I brought you a thing you wanted to know. A thing you spent billions of dollars and, so far as you knew, hundreds of lives, to find out. You set up reconversion stations all over Jupiter and you sent out men by dozens and they never came back and you thought that they were dead and still you sent out others. And none of them came back—because they didn't want to come back, because they couldn't come back, because they couldn't stomach being men again. Then I came back and what does it amount to? A lot of high-flown talk . . . a lot of quibbling . . . questioning me and doubting me. Then finally saying I am

all right, but that I made a mistake in coming back at all.

He let his arms fall to his side and his shoulders drooped.

"I'm free, I suppose," he said. "I don't need to stay here."

Webster nodded slowly. "Certainly, you are free. You were free all the time. I only asked that you stay until I could check."

"I could go back to Jupiter?"

"In the light of the situation," said Webster, "that might be a good idea."

"I'm surprised you didn't suggest it," said Fowler, bitterly. "It would be an out for you. You could file away the report and forget about it and go on running the Solar System like a child's game played on a parlor floor. Your family has blundered its way through centuries and the people let you come back for more. One of your ancestors lost the world the Juwain philosophy and another blocked the effort of the humans to co-operate with the mutants—"

Webster spoke sharply. "Leave me and my family out of this, Fowler! It is a thing that's bigger—"

But Fowler was shouting, drowning out his words. "And I'm not going to let you bungle this. The world has lost enough because of you Websters. Now the world's going to get a break. I'm going to tell the people about Jupiter. I'll tell the press and radio. I'll yell it from the housetops. I'll—"

His voice broke and his shoulders shook.

Webster's voice was cold with sudden rage. "I'll fight you, Fowler. I'll go on the beam against you. I can't let you do a thing like this."

Fowler had swung around, was striding toward the garden gate.

Webster, frozen in his chair, felt the paw clawing at his leg.

"Shall I get him, Boss?" asked Elmer. "Shall I go and get him?"

Webster shook his head. "Let him go," he said. "He has as much right as I have to do the thing he wishes."

A chill wind came across the garden wall and rustled the cape about Webster's shoulders.

Words beat in his brain—words that had been spoken here in this garden scant seconds ago, but words that came from centuries away. *One of your ancestors lost the Juwain philosophy. One of your ancestors—*

Webster clenched his fists until the nails dug into his palms.

A jinx, thought Webster. *That's what we are. A jinx upon humanity. The Juwain philosophy. And the mutants. But the mutants had had the Juwain philosophy for centuries now and they had never used it. Joe had stolen it from Grant and Grant had spent his life trying to get it back. But he never had.*

Maybe, thought Webster, trying to console himself, *it really didn't amount to much. If it had, the mutants would have used it. Or*

maybe—just maybe—the mutants had been bluffing. Maybe they didn't know any more about it than the humans did.

A metallic voice coughed softly and Webster looked up. A small gray robot stood just outside the doorway.

"The call, sir," said the robot. "The call you've been expecting."

Jenkins' face came into the plate—an old face, obsolete and ugly. Not the smooth, lifelike face boasted by the latest model robots.

"I'm sorry to disturb you, sir," he said, "but it is most unusual. Joe came up and asked to use our visor to put in a call to you. Won't tell me what he wants, sir. Says it's just a friendly call to an old-time neighbor."

"Put him on," said Webster.

"He went at it most unusual, sir," persisted Jenkins. "He came up and sat around and chewed the fat for an hour or more before he asked to use it. I'd say, if you'd pardon me, that it's most peculiar."

"I know," said Webster. "Joe is peculiar, in a lot of ways."

Jenkins' face faded from the screen and another face came in—that of Joe, the mutant. It was a strong face with a wrinkled, leathery skin and blue-gray eyes that twinkled, hair that was just turning salt and pepper at the temples.

"Jenkins doesn't trust me, Tyler," said Joe and Webster felt his hackles rising at the laughter that lurked behind the words.

"For that matter," he told him bluntly, "neither do I."

Joe clucked with his tongue. "Why, Tyler, we've never given you a single minute's trouble. Not a single one of us. You've watched us and you've worried and fretted about us, but we've never hurt you. You've had so many of the dogs spying on us that we stumble over them everywhere we turn and you've kept files on us and studied us and talked us up and down until you must be sick to death of it."

"We know you," said Webster, grimly. "We know more about you than you know about yourselves. We know how many there are of you and we know each of you personally. Want to know what any one of you were doing at any given moment in the last hundred years or so? Ask us and we'll tell you."

Butter wouldn't have melted in Joe's mouth. "And all the time," he said, "we were thinking kindly of you. Figuring out how sometime we might want to help you."

"Why didn't you do it, then?" snapped Webster. "We were ready to work with you at first. Even after you stole the Juwain philosophy from Grant—"

"Stole it?" asked Joe. "Surely, Tyler, you must have that wrong. We only took it so we could work it out. It was all botched up, you know."

"You probably figured it out the day after you had your hands on

it," Webster told him, flatly. "What were you waiting for? Any time you had offered that to us we'd known that you were with us and we'd have worked with you. We'd have called off the dogs, we'd have accepted you."

"Funny thing," said Joe. "We never seemed to care about being accepted."

And the old laughter was back again, the laughter of a man who was sufficient to himself, who saw the whole fabric of the human community of effort as a vast, ironic joke. A man who walked alone and liked it. A man who saw the human race as something that was funny and probably just a little dangerous—but funnier than ever because it was dangerous. A man who felt no need of the brotherhood of man, who rejected that brotherhood as a thing as utterly provincial and pathetic as the twentieth century booster clubs.

"O. K." said Webster sharply. "If that's the way you want it. I'd hoped that maybe you had a deal to offer—some chance of conciliation. We don't like things as they are—we'd rather they were different. But the move is up to you."

"Now, Tyler," protested Joe, "no use in flying off the handle. I was thinking maybe you'd ought to know about the Juwain philosophy. You've sort of forgotten about it now, but there was a time when the System was all stirred up about it."

"All right," said Webster, "go ahead and tell me." The tone of his voice said he knew Joe wouldn't.

"Basically," said Joe, "you humans are a lonely lot of folks. You never have known your fellowman. You can't know him because you haven't the common touch of understanding that makes it possible to know him. You have friendships, sure, but those friendships are based on pure emotions, never on real understanding. You get along together, sure. But you get along by tolerance rather than by understanding. You work out your problems by agreement, but that agreement is simply a matter of the stronger minded among you beating down the opposition of the weaker ones."

"What's that got to do with it?"

"Why, everything," Joe told him. "With the Juwain philosophy you'd actually understand."

"Telepathy?" asked Webster.

"Not exactly," said Joe. "We mutants have telepathy. But this is something different. The Juwain philosophy provides an ability to sense the viewpoint of another. It won't necessarily make you agree with that viewpoint, but it does make you recognize it. You not only know what the other fellow is talking about, but how he feels about it. With Juwain's philosophy you have to accept the validity of another man's ideas and knowledge, not just the words he says, but the thought back of the words."

"Semantics," said Webster.

"If you insist on the term," Joe

told him. "What it really means is that you understand not only the intrinsic meaning, but the implied meaning of what someone else is saying. Almost telepathy, but not quite. A whole lot better, some ways."

"And Joe, how do you go about it? How do you—"

The laughter was back again. "You think about it a while, Tyler . . . find out how bad you want it. Then maybe we can talk."

"Horse trading," said Webster.

Joe nodded.

"Booby-trapped, too, I suppose," said Webster.

"Couple of them," said Joe. "You find them and we'll talk about that, too."

"What are you fellows going to want?"

"Plenty," Joe told him, "but maybe it'll be worth it."

The screen went dead and Webster sat staring at it with unseeing eyes. Booby-trapped? Of course it was. Clear up to the hilt.

Webster screwed his eyes shut and felt the blood pounding in his brain.

What was it that had been claimed for the Juwain philosophy in that far-gone day when it had been lost? That it would have put mankind a hundred thousand years ahead in two short generations. Something like that.

Maybe stretching it a bit—but not too much. A little justified exaggeration, that was all.

Men understanding one another, accepting one another's ideas at face value, each man seeing behind the words, seeing the thing as someone else would see it and accepting that concept as if it were his own. Making it, in fact, part of his own knowledge that could be brought to bear upon the subject at hand. No misunderstanding, no prejudice, no bias, no jangling—but a clear, complete grasp of all the conflicting angles of any human problem. Applicable to anything, to any type of human endeavor. To sociology, to psychology, to engineering, to all the various facets of a complex civilization. No more bungling, no more quarreling, but honest and sincere appraisal of the facts and the ideas at hand.

A hundred thousand years in two generations? Perhaps not too far off, at that.

But booby-trapped? Or was it? Did the mutants really mean to part with it? For any kind of price? Just another bait dangled in front of mankind's eyes while around the corner the mutants rolled with laughter.

The mutants hadn't used it. Of course, they hadn't, for they had no real need of it. They already had telepathy and that would serve the purpose as far as the mutants were concerned. Individualists would have little use for a device which would make them understand one another, for they would not care whether they understood one another. The mutants got along together, apparently, tolerating whatever contact

was necessary to safeguard their interests. But that was all. They'd work together to save their skins, but they found no pleasure in it.

An honest offer? A bait, a lure to hold man's attention in one quarter while a dirty deal was being pulled off in another? A mere ironic joke? Or an offer that had a stinger in it?

Webster shook his head. There was no telling. No way to gauge a mutant's motives or his reason.

Soft, glowing light had crept into the walls and ceiling of the office with the departing of the day, the automatic, hidden light growing stronger as the darkness fell. Webster glanced at the window, saw that it was an oblong of blackness, dotted by the few advertising signs that flared and flickered on the city's skyline.

He reached out, thumbed over a tumbler, spoke to the secretary in the outer office.

"I'm sorry I kept you so long. I forgot the time."

"That's all right, sir," said the secretary. "There's a visitor to see you. Mr. Fowler."

"Fowler?"

"Yes, the gentleman from Jupiter."

"I know," said Webster, wearily. "Ask him to come in."

He had almost forgotten Fowler and the threat the man had made.

He stared absent-mindedly at his desk, saw the kaleidoscope lying where he'd left it. *Funny toy,* he thought. *Quaint idea. A simple thing for the simple minds of long ago. But the kid would get a boot out of it.*

He reached out a hand and grasped it, lifted it to his eyes. The transmitted light wove a pattern of crazy color, a geometric nightmare. He twirled the tube a bit and the pattern changed. And yet again—

His brain wrenched with a sudden sickness and the color burned itself into his mind in a single flare of soul-twisting torture.

The tube dropped and clattered on the desk. Webster reached out with both hands and clutched at the desk edge.

And through his brain went the thought of horror: *What a toy for a kid!*

The sickness faded and he sat stock-still, brain clear again, breath coming regularly.

Funny, he thought. *Funny that it should do a thing like that. Or could it have been something else and not the kaleidoscope at all? A seizure of some sort. Heart acting up. A bit too young for that and he'd been checked just recently.*

The door clicked and Webster looked up.

Fowler came across the room with measured step, slowly, until he stood across from the desk.

"Yes, Fowler?"

"I left in anger," Fowler said, "and I didn't want it that way. You might have understood, but again you might not have. It was just that I was upset, you see. I came from Jupiter, feeling that

finally all the years I'd spent there in the domes had been justified, that all the anguish I had felt when I saw the men go out somehow had paid off. I was bringing news, you understand, news that the world had waited. To me it was the most wonderful thing that could have happened and I thought you'd see it, too. I thought the people would see it. It was as if I had been bringing them word that Paradise was just around the corner. For that is what it is, Webster . . . that is what it is."

He put his hands flat upon the desk and leaned forward, whispering.

"You see how it is, don't you, Webster? You understand a bit."

Webster's hands were shaking and he laid them in his lap, clenched them together until the fingers hurt.

"Yes," he whispered back. "Yes, I think I know."

For he did know.

Knew more than the words had told him. Knew the anguish and the pleading and bitter disappointment that lay behind the words. Knew them almost as if he'd said the words himself—almost as if he were Fowler.

Fowler's voice broke in alarm. "What's the matter, Webster? What's the trouble with you?"

Webster tried to speak and the words were dust. His throat tightened until there was a knot of pain above his Adam's apple.

He tried again and the words were low and forced. "Tell me, Fowler. Tell me something straight. You learned a lot of things out there. Things that men don't know or know imperfectly. Like high grade telepathy, maybe . . . or . . . or—"

"Yes," said Fowler, "a lot of things. But I didn't bring them back with me. When I became a man again, that was all I was. Just a man, that's all. None of it came back. Most of it just hazy memories and a . . . well, you might call it yearning."

"You mean that you haven't a one of the abilities that you had when you were a Loper?"

"Not a single one."

"You couldn't, by chance, be able to *make* me understand a thing you wanted me to know. Make me feel the way you feel."

"Not a chance," said Fowler.

Webster reached out a hand, pushed the kaleidoscope gently with his finger. It rolled forward a ways, came to rest again.

"What did you come back for?" asked Webster.

"To square myself with you," said Fowler. "To let you know I wasn't really sore. To try to make you understand that I had a side, too. Just a difference of opinion, that's all. I thought maybe we might shake on it."

"I see. And you're still determined to go out and tell the people?"

Fowler nodded. "I have to, Webster. You must surely know that. It's . . . it's . . . well, almost a religion with me. It's something I believe in. I have to tell the

rest of them that there's a better world and a better life. I have to lead them to it."

"A messiah," said Webster.

Fowler straightened. "That's one thing I was afraid of. Scoffing isn't—"

"I wasn't scoffing," Webster told him, almost gently.

He picked up the kaleidoscope, polished its tube with the palm of his hand, considering. *Not yet,* he thought. *Not yet. Have to think it out. Do I want him to understand me as well as I understand him?*

"Look, Fowler," he said, "lay off a day or two. Wait a bit. Just a day or two. Then let us talk again."

"I've waited long enough already."

"But I want you to think this over: A million years ago man first came into being—just an animal. Since that time he has inched his way up a cultural ladder. Bit by painful bit he has developed a way of life, a philosophy, a way of doing things. His progress has been geometrical. Today he does much more than he did yesterday. Tomorrow he'll do even more than he did today. For the first time in human history, Man is really beginning to hit the ball. He's just got a good start, the first stride, you might say. He's going a lot farther in a lot less time than he's come already.

"Maybe it isn't as pleasant as Jupiter, maybe not the same at all. Maybe humankind is drab compared with the life forms of Jupiter. But it's man's life. It's the thing he's fought for. It's the thing he's made himself. It's a destiny he has shaped.

"I hate to think, Fowler, that just when we're going good we'll swap our destiny for one we don't know about, for one we can't be sure about."

"I'll wait," said Fowler. "Just a day or two. But I'm warning you. You can't put me off. You can't change my mind."

"That's all I ask," said Webster. He rose and held out his hand. "Shake on it?" he asked.

But even as he shook Fowler's hand, Webster knew it wasn't any good. Juwain philosophy or not, mankind was heading for a showdown. A showdown that would be even worse because of the Juwain philosophy. For the mutants wouldn't miss a bet. If this was to be their joke, if this was their way of getting rid of the human race, they wouldn't overlook a thing. By tomorrow morning every man, woman and child somehow or other would have managed to look through a kaleidoscope. Or something else. Lord only knew how many other ways there were.

He watched until Fowler had closed the door behind him, then walked to the window and stared out. Flashing on the skyline of the city was a new advertising sign —one that had not been there before. A crazy sign that made crazy colored patterns in the night.

Flashing on and off as if one were turning a kaleidoscope.

Webster stared at it, tight-lipped.

He should have expected it.

He thought of Joe with a flare of murderous fury surging through his brain. For that call had been a cackling chortle behind a covering hand, a smart-Aleck gesture designed to let man know what it was all about, to let him know after he was behind the eight-ball and couldn't do a thing about it.

We should have killed them off, thought Webster, and was surprised at the calm coldness of the thought. *We should have stamped them out like we would a dangerous disease.*

But man had forsaken violence as a world and individual policy. Not for one hundred twenty-five years had one group been arrayed against another group in violence.

When Joe had called, the Juwain philosophy had lain on the desk. I only had to reach out my hand and touch it, Webster thought.

He stiffened with the realization of it. I had only to reach out my hand and touch it. *And I did just that!*

Something more than telepathy, something more than guessing. Joe knew he would pick up the kaleidoscope—must have known it. Foresight—an ability to roll back the future. Just an hour or so, perhaps, but that would be enough.

Joe—and the other mutants, of course—had known about Fowler.

If you prefer a low-priced blade
That's really thrifty and top-grade—
Want smooth, slick shaves with ease and speed—
This Thin Gillette's the one you need!
New kind of edges
on steel hard enough to
cut glass
THIN
Gillette
BLADES
Gillette
4 for 10¢
Produced By The Maker Of The Famous Gillette Blue Blade

Their probing, telepathic minds could have told them all that they wished to know. But this was something else, something different.

He stood at the window, staring at the sign. Thousands of people, he knew, were seeing it. Seeing it and feeling that sudden sick impact in their mind.

Webster frowned, wondering about the shifting pattern of the lights. Some physiological impact upon a certain center of the human brain, perhaps. A portion of the brain that had not been used before—a portion of the brain that in due course of human development might naturally have come into its proper function. A function now that was being forced.

The Juwain philosophy, at last! Something for which men had sought for centuries, now finally come to pass. Given man at a time when he'd have been better off without it.

Fowler had written in his report: *I cannot give a factual account because there are no words for the facts that I want to tell.* He still didn't have the words, of course, but he had something else that was even better—an audience that could understand the sincerity and the greatness which lay beneath the words he did have. An audience with a new-found sense which would enable them to grasp some of the mighty scope of the thing Fowler had to tell.

Joe had planned it that way. Had waited for this moment. Had used the Juwain philosophy as a weapon against the human race.

For with the Juwain philosophy, man would go to Jupiter. Faced by all the logic in the world, he still would go to Jupiter. For better or for worse, he would go to Jupiter.

The only chance there had ever been of winning against Fowler had been Fowler's inability to describe what he saw, to tell what he felt, to reach the people with a clear exposition of the message that he brought. With mere human words that message would have been vague and fuzzy and while the people at first might have believed, they would have been shaky in their belief, would have listened to other argument.

But now that chance was gone, for the words would be no longer vague and fuzzy. The people would know, as clearly and as vibrantly as Fowler knew himself, what Jupiter was like

The people would go to Jupiter, would enter upon a life other than the human life.

And the Solar System, the entire Solar System, with the exception of Jupiter, would lie open for the new race of mutants to take over, to develop any kind of culture that they might wish—a culture that would scarcely follow the civilization of the parent race.

Webster swung away from the window, strode back to the desk. He stooped and pulled out a

drawer, reached inside. His hand came out clutching something that he had never dreamed of using—a relic, a museum piece he had tossed there years before.

With a handkerchief, he polished the metal of the gun, tested its mechanism with trembling fingers.

Fowler was the key. With Fowler dead—

With Fowler dead and the Jupiter stations dismantled and abandoned, the mutants would be licked. Man would have the Juwain philosophy and would retain his destiny. The Centauri expedition would blast off for the stars. The life experiments would continue on Pluto. Man would march along the course that his culture plotted.

Faster than ever before. Faster than anyone could dream.

Two great strides. The renunciation of violence as a human policy—the understanding that came with the Juwain philosophy. The two great things that would speed man along the road to wherever he was going.

The renunciation of the violence and the—

Webster stared at the gun clutched in his hand and heard the roar of winds tumbling through his head.

Two great strides—and he was about to toss away the first.

For one hundred twenty-five years no man had killed another—for more than a thousand years killing had been obsolete as a factor in the determination of human affairs.

A thousand years of peace and *That,* thought Webster, *is the* one death might undo the work. One shot in the night might collapse the structure, might hurl man back to the old bestial thinking.

Webster killed—why can't I? After all, there are some men who should be killed. Webster did right, but—he shouldn't have stopped with only one. I don't see why they're hanging him, he'd ought to get a medal. We ought to start on the mutants first. If it hadn't been for them—"

That was the way they'd talk. *wind that's roaring in my brain.*

The flashing of the crazy colored sign also made a ghostly flicker along the walls and floor.

Fowler is seeing that, thought Webster. *He is looking at it and even if he isn't, I still have the kaleidoscope.*

He'll be coming in and we'll sit down and talk. We'll sit down and talk—

He tossed the gun back into the drawer, walked toward the door.

THE END.

The Bottled

by

ROSS ROCKLYNNE

The elevator doors slid open. A tall man, trimly garbed in the gray-edged black uniform that was the habiliment of members of the Solar Guard, stepped into the room. He looked around for a second with patient gray eyes, then moved lightly toward "Uncle Jim" Post's desk. Uncle Jim, referred to thus by his millions of subordinates, was the supreme commander of the SAC—Solar System Associated Guard.

"At ease, lieutenant," said Post, as the black uniformed man drew himself to attention.

Lieutenant Marc Sturm relaxed. He said politely, "I was requested to report to you at this time, sir."

"Yes. lieutenant. Lieutenant, your application for marriage has been rejected."

"Yes, sir." Sturm showed no reaction.

"Do you have any objection to raise?"

"Yes, sir. I believe the Control Council's decision unfair."

"It's not unfair if the human race expects to make the progress charted out for itself."

Sturm said nothing. Post squirmed a little, as if with repressed rage at Sturm's silence. Post was tall, bony, hawk-nosed. with blue eyes that could be kind. In the silence, he let his eyes wander toward the window. Outside, the high traffic lanes swarmed with twenty-fifth century cars. An occasional rocketship, or jet-propelled planet car moved through the violet-blue atmosphere. This was Satterfield City on the planet Mars—a Mars that had been partially rehabilitated by the human race.

Post's eyes came back, dropped to the eugenics application on his desk. He raised a corner of the form. He said,

"Lieutenant, you have a right to know the exact reasons for the

Men

***Two** men—hunter and hunted—were trapped in that natural bottle. One started digging his way out, but it was a trickier problem than he guessed—*

Illustrated by Swenson

rejection. Your psychological portrait, as prepared by the Control Council reads .8w-.7p-.2c-.5g-.5f. I think you must know that portrait by heart. I think you must also know Lieutenant colonel Susan Quincy's portrait by heart and realize that they don't dovetail."

There was something challenging in his voice.

Sturm's face was expressionless. For the first time, he volunteered a question. "May I ask why the Control Council gave the ultimate decision for the rejection into your hands, instead of dealing with me direct?"

Post smiled. "You may. I wanted you to ask that question. The fact is, there was a shred of doubt in the minds of the Council. Namely, that in some respects your psychological portrait and that of Susan's do have some items which dovetail. You're both .8w's for instance, which is good. And there's a divergence of only .3 in

'p,' the factor of rigidity—in your favor. Which is as it should be in a marriage, I suppose. However, the rejection still stands, lieutenant."

His eyes averted. "The fact is, lieutenant, Lieutenant colonel Susan Quincy outranks you."

Sturm's sudden agitation was betrayed only by the rubbing of the fingers of both hands across each other.

He said, "I don't understand what that would have to do with it, sir."

"It has everything to do with it. Susan's prestige for instance. She's the commander of the Woman's Martian Police Corps, you know. We can't have the commander of the WMPC married to a man who'll never go beyond the rank of second lieutenant."

The bomb that Post knew he had to throw exploded somewhere deep among the recesses of Sturm's mind. No slightest flash or sound of the explosion came back. Sturm stood there, wooden-faced.

Post squirmed again, as if with controlled rage. He said, "Man, don't you have *anything* to say for yourself?"

Sturm said, "I understand that your point-blank statement that I'll never rise above my present rank arises from my failure to capture Gull Norse last week, when I practically had him in my hands."

"That's partly it. But your failure to capture Gull is merely a result of your faulty psychological pattern."

"I beg to differ with your statement." Sturm's voice was soft and polite. "I haven't failed to capture Gull Norse."

"You haven't?" Post raised an ironic eyebrow.

"No. His capture by me is merely postponed. Gull Norse is still my assignment. I expect to make his arrest in anywhere from one to four weeks."

For the first time, Sturm appeared to lose his remarkable composure. He bit at his lower lip, blinked rapidly. His slowly rubbing fingers balled up into half-fists.

"I also want to differ with the Control Council on that . . . that psychological portrait of mine. Mathematical symbols can't take into account every factor of character, sir. I don't disagree with what the portrait does tell. It's what it leaves out. .8w., character integration, is good, and sets me up as a pretty sound citizen. .2c, the factor of extraversion, points me out as pretty much of a poor mixer, not very sociable, not very good at small talk or quick on the uptake. .5g isn't good either, because it indicates a general mental capacity about .3 below Susan's . . . pardon me: below Lieutenant colonel Quincy's. In other words, just an average intelligence. .5f indicates a certain neuroticism—I guess I do show signs of being neurotic, because if I weren't, I wouldn't

repress myself in front of you and I'd blow my top."

Post's blue eyes closed a little, became quizzically enigmatic. He leaned back in his chair. "Go on, lieutenant."

Sturm's words came a little faster, a little harder. "I left the rigidity factor out till last, sir. I've got a Zp rigidity, sir. That's what I mean when I say the Council can't put everything into symbols. They can't put into symbols the four years I spent at Decimal Point—" Decimal Point was the popular name for Marto-Tellurian Spatial Academy. "They can't explain by symbols why, if I'm so stupid, I came out with third highest honors in my class."

Post's voice was oddly muffled. "I'm not sure I knew that, lieutenant. Please go on."

Sturm's hands were fists now. "Don't think I wasn't conscious of the general inferiority of my 'g' rating during those years at the Point. Other cadets breezed through their exams without hardly glancing at a book. I had to bone up for hours—even days, and all night. But when the grades were handed out, I came out on top, generally. I'm pointing out that the factor of rigidity includes the general mental pattern of the ability to work—and to fight too—and a sort of dogged, stupid perseverance that doesn't know when to give up. That's why I think the Council is way off. They don't understand those four years of mine at Decimal Point, and they don't understand that what I don't get by brainwork I get by a bulldog stick-to-it-tive-ness."

He paused. His full lips curled slightly, just a shade toward insulting insubordination. "I don't suppose you'll understand it either."

Post blinked. He came erect. His voice was quick. "On the contrary! I do understand." His eyes twinkled. "Are you being persevering now?"

"Yes, sir. I intend to marry Susan."

"Oh-ho!" Post's eyebrow was ironic again. "Your analysis of your own portrait doesn't particularly change it, you know. Just makes it a little clearer. My objections still stand."

He was watching Sturm closely.

Sturm's eyes became patient again, without a trace of humor. "After I bring Gull Norse in, sir, I'll automatically receive a raise in rank."

"From whom?"

"From you, sir. Having received a raise in rank, I don't feel you'll stand in the way of our marriage."

Post grinned widely, then laughed outright. "Lieutenant, you amaze me with your calm assumptions. But I'll tell you what." His hand slapped the desk. "It's a deal! You'll jump to a captaincy and you can marry Susan—*if* you bring Gull in."

"*When* I bring him in, sir. Which will be sometime in the next month, probably sooner. Is that all, sir?"

"What else is there?" Post's smile was wry. "You've gained

everything you wanted from this interview, haven't you? Good day, lieutenant."

"Good day, sir."

Sturm saluted smartly, turned, and shortly the elevator swallowed him up again.

Post sat still for a moment, musing, then reached out and pressed a series of buttons on his desk. Shortly, a buzzer sounded, and Post scooped up the radiophone.

"Susan—Uncle Jim. Yes, I just spoke with him, and I did everything I could. I insulted him—not that the insults weren't rooted in clear, cold fact. I'm sorry, my dear, but those symbols *do* tell a lot. Anyway, he's determined to bring Gull in, and I hope he can swing it, for your sake. But it's a tough deal, and my personal feelings are that with a man like Gull, an excess of 'p' isn't going to make up for a lack of 'g.'"

In the elevator, Second lieutenant Marc Sturm had a very different expression than the one he had showed Uncle Jim Post. It was a hangdog, suffering expression, as if he had been beaten with whips. Or as if a corps of psychiatrists had been grilling him to detect traces of insanity. He felt completely muddled inside. He was never more ready to give up in his life than when Post had, point-blank, come out with the bad news. Something had made him hang on—the same something that made him hang on when he knew he was going to fail a semester at Decimal Point. Or the same something that had made it possible for him to attain the rank of second lieutenant.

His face was under control again when he stepped smartly from the elevator. He went with brisk step toward the transparent sheet of light which served as a door to the street outside. He was just about to step through when somebody tapped him on the shoulder. He turned, frowning. A little man with tortoise-rimmed glasses, and dressed in a baggy suit, grinned at him.

"Lieutenant, this is luck!" His voice was rapid, reedy. "I've been hunting for a story for the Satterfield *Times*. I says to myself, Man, if only I could run across that Second lieutenant Marc Sturm. I could get a couple paragraphs out of him about how the big bad man of space Gull Norse walked away from him one evening last week without so much as a gunshot."

Marc Sturm's impulse was to grab the scrawny throat and choke the life out of it. He said in a very polite tone, "I'm sorry. I have nothing more to add to that story. Good day."

The man said, sardonically touching his hand to his hat, "O. K., soldier-boy. Don't blame you. I'd try to kill publicity on that myself."

Marc had already turned away, gone through the door. Just outside the door, street-noises around him, he stopped, hot eyes closed. Then something clicked. He went

back inside, found the reporter standing in front of one of the elevators.

Marc said, stopping before him, "Pardon me. I can give you a few lines. Quote: Questioned by reporters, Lieutenant Marc Sturm today expressed surprise that most of the comments of the newspapers on the matter of the escape of Gull Norse from his hands indicate that Gull's escape is a permanent affair. Sturm said, 'The comments mostly indicate the stupidity of the managing editors who allowed the stories to be published. I am unable to make my plans public knowledge, but in anywhere from one to four weeks, Gull Norse will be in the hands of the law.'

"Sturm added: 'If anyone cares to look into my record, he may do so. I've never pitted myself against an outlaw of Norse's type. On the other hand, I've never failed to bring in my man. Either dead or alive. I'll probably be forced to bring Gull in dead.' Sturm looked in good spirits, and was completely unabashed about charges which described the Gull Norse escape a result of his stupidity. End quote. Did you get that?"

"Every word," the reporter said, with a bored yawn. He turned away. "I'll try to give you a paragraph or two, soldier-boy," he said, indulgently. "Better look out for Gull Norse, though. He probably won't like that threat to bring him in dead."

The next day, Marc Sturm left his quarters in full uniform, and caught the monorail for Solar Guard Depot, where they had his two-man patrol ship in readiness to "hit heaven." On the way, he bought the Satterfield *Times*. On page 2 he found the story, very surprisingly reproduced word for word. A couple of paragraphs had been added:

> Sturm's boast was made as a result of his bungling effort to bring one of the most feared criminals in the System under the wings of the law last Wednesday. Sturm, sometimes referred to as the fearless second lieutenant, captured Gull in a joy-joint when Gull was supposedly drunk. Sturm fell for the dodge, but Gull feigned intoxication for the purpose of making Sturm relax his guard. Gull broke loose, making an easy getaway.
>
> Sturm's previous record shows that most of his assignments dealt with petty lawbreakers, most of whom, it is admitted, were under the influence of liquor.

Sturm's big hands crumpled the paper with a slow crunching motion. "One for the scrap book," he thought bitterly. Yet he had expected no less.

Second lieutenant Marc Sturm left the planet Mars in his two-man patrol boat on Sol 2, Hour 21, Martian Equatorial Time. He preferred not to blast around the Sun on a triple straight-angle, but instead chose a slow Hohman curve for the first part of his trip.

He had brought certain equipment along with him. It was part of a plan he had formulated over a period of time. For several days, he did an intricate wiring job beneath the bulkheads, and installed several sets of an equally intricate pattern of tubes and inductance

coils throughout the rear of the ship. He laid wires under the deck plates to his instrument board in the partly transparent nose of the ship. He attached these to a small switchboard set face down in the control panel.

On the third day he was finished, and bolted all plates back into place. He then took a case of canned goods, placed it on the floor at the rear of the ship. He went forward, flipped on the finger-switch. Instantly, there was an electric tension in the air, felt this far forward so strongly that every hair on Sturm's body pointed toward the locus of the force-field. The case of canned goods at the same moment jumped up from the deck plates violently and remained suspended in the air at the center of the force-field, slowly rotating.

Sturm smiled, and as the ship crawled through the cosmic emptiness at a snail's pace he tried the stunt over and over again, securing a pleasurable sensation from imagining that it was Gull Norse who hung there so helplessly.

He tired of his Hohman curve, now, which wasn't getting him any place, but had allowed him to leave the controls for several hours at a time. He poured the power on, slipped into a straight angle trajectory, and in days to follow skirted the very edge of the Sun's "boiling zone," then left the Sun behind.

As the Sun's girth began to diminish with distance, he often quartered his vision plate, taking a sternward view of the cosmos. He swept every tiniest segment of sky to the rear, hoping to pick up a telltale exhaust, indicating he was being followed. He saw no such sign; which of course meant nothing. The pursuing ship, if there was one, might be using the new spot-jet method of propulsion.

He passed Mercury's orbit, then set up a mass-detector which would enable him to find the tiny, errant asteroid on which he intended to land.

He found it soon enough, and almost ten days after leaving Mars, landed.

The landing was not a conventional affair. To anyone watching, it was very apparently a forced, not an intended landing. A flaring, explosive burst of vapors leaped from the pilot blast of the ship on the starboard side. The little ship spun madly in space, then made a few feeble tries at turning her nose toward the asteroid only a few thousand miles away. It did make headway, finally landed broadside on, with only a few minor jars and bumps.

After Sturm accomplished the deception—by adding a few grams of *d-c-tonite* to the starboard pilot blast—he leaned back and lighted a cigarette. The stage had been set. He could only hope that one of the chief characters had been in the audience, and would soon enter to speak his lines.

Not far out in space, one of the new spot-jet ships hung moveless. For several hours the occupant of the ship had been studying the

activities of the moving figure down on the asteroid. The figure was apparently dismantling a fused pilot blast, inserting a spare.

The figure now went inside the ship, leaving the outer door of the air lock open. The man watching these activities uttered an exclamation, got the spot-jet ship into furious motion, and in ten or fifteen seconds flat had completed a great circle which put it on the other side of the asteroid.

At the same swift pace, it hurtled along a few feet above the surface of the asteroid, landed about ten feet from the Solar Guard patrol ship. The hatchway opened and a big man got hurriedly out. He ran toward the Solar Guard ship, his fifteen-pound flame pistol hanging from his gauntletted fingers. He went straight through the outer door of the air lock, closed the outer door, then valved open the inner door.

He stepped into the ship, centered the pistol on the broad back of the man sitting before the instrument board, apparently studying celestial maps.

"Turn around, you," said the man with the pistol.

Thus came Gull Norse.

Lieutenant Marc Sturm turned around as he was bidden. He didn't rise. He turned in the swivel chair slowly, making it plain that he was controlling his terrific surprise. As he turned, he put his elbows back on the board. His left elbow was touching the finger switch which would shortly activate the force-field.

Gull said as their eyes met, "Sturm, what's your game?" I've been following you for eight-nine days. Where you bound?"

His great, red-rimmed, fierce eyes constantly moved over Sturm's calm face. Gull Norse was big. Gull was the shaggy bear of the space lanes. Gull was the big, laughing, life-loving, enigmatic robber whom men hated and loved at the same time. He was the dreadful creature mothers scared their children with. He was a romantic light of glory shining in the imaginary sky of teen-age girls searching for a hero. He was a big lonely brain who murdered the king's English but could at will converse with college professors; and had, some college professors realized later with a start.

He was big, but he had a starvation curiosity bigger than he was. A curiosity that outweighed him, made him top-heavy.

Marc Sturm said, smiling faintly, "Gull, some day your curiosity is going to swallow you in one big gulp, and then there won't be any Gull Norse left."

"Oh, ho! Now what do you mean by that?"

"Well, why did you follow me?"

Gull's ferocious expression changed. He burst into a great thunderous merry laugh. "Listen to him! Why did I follow him! He's crazy! Listen, Sturm I read the paper, and there it says that that fearless he-man of the

Solar Guard is going to bring me in dead. Am I going to let that second lieutenant cavort around space laying some long-range plans to drag me into a net? That second lieutenant is small fry, I say, but even small fry got spitting grease around 'em."

He paused, really laughing, and enjoying his own fanciful verbiage.

"Now I repeat, Sturm: What you got in mind?"

Sturm laughed too. "This," he said. He pushed back with his left elbow. As before, a magnetic stress crackled the air. Through the breakless glass of Gull's helmet, Sturm could see the outlaw's mass of curly black hair part itself in the middle, the hair sticking out horizontal on either side. Then Gull was snapped into the air, his spacesuited legs clicked rigidly together, his arms pressed with invisible clamps to his side. He still held the gun, but was quite powerless to use it.

He rotated slowly, and every time his face came into Sturm's vision it continued to hold hurt surprise.

Finally Gull said accusingly, "Sturm, this is a dirty trick."

Sturm sat down again and leaned back. "I planned it, Gull. Your curiosity was part of the plan. That's a Type-Q fore-field, not much different than opposed electromagnets."

Gull's voice was grumpy, "Don't tell me. I know all about a Type-Q field." He blinked a little, then said in a strange tone, a wondering tone, "Yeah, I know all about 'em."

His expression turned eagey. He said in a tone of admiration. "Lieutenant, I never figured you for this much brains. I guess that pilot-blast blow-up was a fancy dodge, all right. Had *me* fooled. But you know, lieutenant—you know the reason I come here? It was to give myself up."

"Please, Gull," said Sturm. "You pulled a gun on me, remember?"

"Sure I remember. That was just to make you hold still while I told you my story. See, I'm tired of this life. I want to give myself up and get a light sentence and then live like an honest man." His eyes turned humid with moisture. "Have a wife and kids, maybe. I'm not such a bad guy, Sturm. I've never killed a man. I'm just a high-class robber. I can turn back about seventy percent of the loot I've taken in. The other thirty percent I'll work my fingers to the bone to get. I'll show you where the loot is if you'll promise to tell the authorities I give myself up voluntary."

"You would?" Sturm said, his eyes showing his interest.

Gull looked at him doubtfully. "Sure I would. Word of honor." He had a staunch look of honesty in his eyes. When Sturm rubbed at his chin, Gull said, "So how about taking me out of this Type-Q field and declaring a truce?"

Sturm rose, chuckling. He heaved a tremendously long sigh.

"Gull, they used to tell me how funny you could be when you wanted to. You're being really funny, now. Nope, sorry. You stay in the field until we get to Mars. I wouldn't take a chance on freeing you. I've got you and I'll keep you—this time."

Gull turned into a raging bundle of straining muscles. The tearful moisture of an honest man disappeared. He hurled some epithets at Sturm and added: "Next time I get a chance I'll strangle you with my bare hands!"

Marc Sturm hit heaven shortly, and roared full blast toward the edge of the boiling zone. Behind him, a disgruntled outlaw had gone sound asleep, hanging helplessly in midair, now and then muttering angrily to himself. The metal parts of his spacesuit were now rigid magnets held in the force-field's locus of energy. In effect, he was a bar magnet, fed from the inductance fields created by the Type-Q magnets in the walls.

Marc Sturm's smile was wry. "Gets-his-man Sturm," he thought to himself. Still, when the newspapers got this story they'd be bound to temper their write-ups with the respect he deserved. Marc permitted himself to gloat a little. He thought of Colonel Post's grudging reversal of opinion. He thought of Susan's adoration. They made good pictures, good things to dream about. And it was Marc Sturm's nature to dream—to dream too much. Sometimes about things that hadn't happened yet.

What he didn't dream of was that the dreams might not turn out as planned.

It happened after the ship cut Mercury's orbit, fled at ever-mounting speed through the very fringe of the boiling zone. Marc Sturm rose stiffly from the controls, went through the starboard companionway back to the galley. He made some coffee and cheese sandwiches, with the idea of feeding Gull, but before he could take it out, Gull, apparently wakened by the smell of food, roared through the ship, "Hey, Sturm! I could use some of that coffee!"

It was a good-natured roar, though, and Sturm figured Gull's humor was back. He took a vacuum bottle of the coffee out to Gull, unbuckled his helmet, and held the nipple of the bottle to Gull's lips.

Gull jerked his head back in surprised rage.

"Say," he snarled, "I don't intend to be bottle-fed like any brat of an infant. Why don't you get some gravity aboard this boat?"

"O. K.," Sturm said genially. He felt he could afford to be genial.

He fired some blasts from a pilot jet. On the vision plate, the celestial panorama—a heavy sheet of stars and one flaming edge of the Sun's corona—began to rotate until it was whirling at a good steady rate. Sturm felt himself gain weight as the centrifugal force created a full Tellurian gravity.

He went back to the galley, poured coffee into a cup and brought a cheese sandwich as well.

Gull, of course, was motionless in relation to surrounding space. But he was rotating on an axis in relation to the ship. Sturm, who could walk through the field without danger, as he had carefully excluded items of a metallic nature from his clothing, took hold of Gull's shoulders, made him motionless with respect to the ship. Then, since Gull was still lying exactly on the ship's axis, where there wasn't any gravity at all, he turned him by main force at right angles to his present position.

In this position, Gull was virtually drinking and eating upside down, but there was enough gravity to keep coffee in the cup, and Gull seemed perfectly satisfied with this arrangement. Sturm held him there until he finished eating, then let him go back into the position the force-field demanded.

"That's better," Gull said, smacking his lips. "Don't know why you Solar Guard misters don't like gravity."

"I don't particularly care whether there's gravity or not. Gravity does make eating easier, though."

"Sure it does," Gull said heartily. "Sturm, you're a good guy after all. Why not leave the ship the way she is? No use wasting fuel to rotate the ship every time we eat."

Marc Sturm figured Gull was right. Anyway. it certainly made no difference.

Directly after that, Sturm made a careful checkup of space ahead, saw no sign of dangerous celestial flotsam, put the controls to bed, and went to bed himself, falling instantly asleep.

He as instantly awoke, spine tingling with the most violently horrible sense of catastrophe he'd ever had.

He came tremblingly erect, snatched his flame pistol from the belt hanging on the bunk, went for the control room, panic working on his face. Just then there was a burst of light, showering sparks, the unforgettable odor of pure ozone rushing up his nostrils.

He burst into the control room a second later, was enclosed by that glare. Through the glare, a big hefty figure hurled itself at him.

"Gull!" Sturm yelled incredulously.

Gull was on him, grunting. He caught Sturm's wrist, bent him backward.

"Gotcha now," he shouted amiably.

Sturm went sick all through his body. Kaleidoscopic picture of horror swamped his brain. Newspaper stories—"the fearless second l i e u t e n a n t—"; "Uncle Jim—Lieutenant colonel Susan Quincy outranks you . . . the result of a faulty psychological pattern—"; the psychological portrait with its damning m a t h e m a t i c a l truths "—general mental capabilities not so good—not so good at all—Rigidity? Yes, very good. Very

good indeed. But no brains—no brains—no brains—no brains—"

That all went through his mind. Drops of hot water falling for a thousand years on his tortured head. He went wild, mentally and physically. He broke from Gull's grip, grabbed Gull around the waist and threw him smashingly. The big heavy figure sailed ludicrously through the air. Gull didn't expect anything like that. Nor did Sturm expect Gull to crash into the thousand-and-one fragile parts of the instrument board.

Gull hit the instrument board hard. Glass shattered. The lights went out. The vision plate went gray and blank. The ship leaped like a wild thing, a bucking bronco in midspace. The odor of ammonia from the cooling system was a burning stench. Calcium from the air refiner choked up the air. Lastly the switchboard on the bulkhead shorted itself, made lightning through the ship. In that new glare, Marc Sturm saw the walls of the ship moving backward. Actually, the ship had grabbed him in a mighty fist and tossed him. Tossed him straight forward toward where Gull Norse sprawled. That was the last Marc Sturm knew until he woke up an hour and a half later in a spacesuit.

"I put you in the spacesuit," said Gull Norse amiably. He was hanging onto a guide rail, but the bucking motion of the ship was not intense now. Gull added, "I think that was mighty white of me. Else you'd have suffocated. But as I say, you're a good guy, Sturm, even if you have got some shortcomings."

"Yeah, I know all about those." Sturm saw he was strapped to the guide rail. He unfastened the strap dully. He looked around the ship. There was one light burning. Too, a quarter section of the vision plate was in operation.

Gull's big flat-planed face was whimsical. "I been working around the ship, getting things shipshape, kind of. Got one light burning, got part of the vision plate operating, found out there's one jet that ain't fused shut. Got the ship on a more or less even keel. Only trouble is, we're inside the boiling zone."

"Inside the boiling zone!"

"Sure. Air in here is hot, like Hades. Our spacesuit thermostats are keeping us cool enough, though. But not for long."

"Not for long?"

"That's it. We're done for." Gull's expression turned genuinely sad, regretful. "I sure hate to cash in my chips now, Sturm. It's a grand life, isn't it? We're falling into the Sun."

"You're sure of that."

"Sure I'm sure. Sturm, remember what I said a while ago about turning myself in and leading an honest life? I almost meant that. Almost. But somehow now that we're about to pass out, I keep thinking of a wife and kids. Sentimental, ain't I?" He was laughing at himself. He stuck his tongue in his cheek and got a thoughtful expression. "Sturm,"

he said solemnly, "I got a ambition to write poetry."

In spite of himself, Sturm laughed out loud. "You?"

Gull drew himself up, offended. "Mr. Sturm, please be informed that language in all its subtle connotations and nuances strikes a responsive chord in my savage breast. I gain a sheer delight from the work of the old masters—Shelley, Rupert Brooke . . . ah! there was a potential master. Only trouble was he died too young to develop his true capabilities. Then the masters of the light touch—light verse. Gull Norse, for instance. Ah . . . let's see now . . . uh . . . something about . . . Sturm, listen to this:

"Don't trust me, my friends—'twill be your loss
I'll tell you what's the trouble:
When I make a promise I always come across—
But mostly double."

Sturm smiled. "A good portrait of the man," he said.

Gull scowled. "I wasn't intending that as a picture of me."

Sturm was impressed. "You made that up on the spur of the moment?"

"Sure I did. Figure what I could do if I had some time. You see, that's the big difference between me and you, Sturm. You figured out a plan to trap me, and I fell into the trap. But it took you a good long time to plan it. You're just too slow to figure things out. Now me, I've got a quick mind. Soon's I got into the trap, I hit on the way to get out. That coffee gag—did you fall for that! You just didn't catch on. See, I'd just as soon suck coffee out of a nipple as the next man, but I made you rotate the ship at a good fast pace in order to simulate gravity so coffee would stay in a cup. I happened to know that I was almost exactly on the ship's axis of rotation. Well, you brought me to a standstill when you gave me the coffee, but remember you couldn't bring ship's air to a standstill. The air kept turning around in the ship. Few hours after you went to sleep, I was spinning around in the ship at a terrific rate, right with the air."

Sturm winced. "Maybe I get it. The metal parts of your spacesuit were cutting lines of force, creating energy strains."

"Sure. The force-field built up to such a high potential there was a power-backlash to the type-Q force-field machinery. The machinery couldn't take the load. Result, big blow-out and I was free."

A moment later, gloom descended on him. "Lot of good it did," he muttered resentfully.

Marc Sturm stirred from his moveless position. All this while he and Gull had been talking, another part of his mind, a tenacious part, had been working.

He jerked his head at Gull. "You know, Gull, speaking of differences between us, you've already given up. You're ready to stop fighting."

"Oh! Listen to that, would you? He talks about fighting when there's nothing to fight!" Gull made a sarcastic show of talking to a third person.

"You've given up," repeated Sturm, "but I haven't."

Gull looked at him in a very kindly way. "Do we have to starch our upper lips?"

Sturm said simply, "I have to. For one thing, I'm not going to let the Sun incinerate my plans for a promotion and marriage." He hesitated, then smiled. He told Gull about his interview with Post.

Gull looked sympathetic. "Now ain't that a shame when they stuff a man's soul into an equation. You reckon they got a psychological portrait of me too?" he asked with avid interest.

"I should think they would have. They take it pretty early."

"Yeah? How come they ever started a system like that?"

Sturm shrugged dismally. "It's pretty accurate. The Cattell System, they call it, after a twentieth century psychologist."

"Is that so? How d'you suppose I'd stack up under the system, Sturm? I got good brains, for instance."

Sturm nodded. "About .9g, I'd say. And about .4w."

"What's that?"

"'w' is character integration. Not so good in your case, Gull."

Gull bridled, but Sturm went on, with grim humor. "And about .9c1—that's a Bohemian factor. Say it isn't so! Extraversion? Well, about .8c, I'd say. You're a perfect extrovert, Gull, practically."

Gull grinned broadly. "That makes me out a pretty good guy—except for that 'c1' business. I don't like that. What else?"

"About .4p—rigidity. Which brings us back where I started, come to think of it. Namely, if you're ready to throw in the towel, I'm not. Just a minute."

Sturm left Gull mulling symbols around on his unshaved lips, and hurriedly moved over to the instrument board and extracted a "Star Emphemeris" from a drawer. He opened the paper-bound book on the board and leafed through the Bible-paper pages. He spoke with his back to Gull.

"Gull, I happen to remember there's a planet inside the boiling zone about a half million miles. Vulcan. Some scientists landed there eight-nine years ago, but their ships and spacesuits didn't have the insulation value ours have, and the trip was so disagreeable they came back and reported 'nothing of interest.' They did compute the planet's orbit though, degree of libration, diameter, distance from the Sun and so forth.

"It keeps one face to the Sun, but it wobbles sharply back and forth like a perfect pendulum. That creates a 'twilight' zone about a hundred miles wide, where it's hot sometimes, cold others. No atmosphere, but we can land and repair the ship. So maybe—*Hey!*"

He broke into a shout of joy.

Gull came forward, scowling over his shoulder at the "Emphemeris." His eye caught on the data immediately.

"Well," he rumbled grudgingly, "I guess you got something. Vulcan's less than a hundred thousand miles away!"

Lieutenant Marc Sturm and Gull Norse, the outlaw, landed on Vulcan seven hours later. Only "landed" is hardly an accurate description. The single rocket-jet got them into the fold of the planet's .2 of a Tellurian gravity, and after that it was the planet that engineered the landing.

Up until the very last few moments, Sturm thought that he had done pretty well. But trying to bring a ship into a landing on one jet is similar to trying to balance yourself on the two hind legs of a chair. In this case, the chair tipped.

"We'll have to jump," said Sturm.

Gull Norse already had the air lock open. They stood on the very lip, watching the whole universe revolve. Sometimes they saw the Sun, one fiery segment of it, anointing the tumbled cliffs and mountains with an hibiscus-scarlet fire; sometimes, as the ship whizzed around like a maddened pinwheel, they saw nothing but clear-cut stars. They finally jumped, when nothing but two hundred feet of vacuum separated them from the planet.

Each held a flame pistol, a small rocket-blast in itself. Each pistol was attached to the waist by a thin chain. Sturm, tumbling down with a terrific sense of vertigo, saw the scarlet surface rushing up. He shouted, senselessly. He got into position to break his fall with the pistol. He did manage to cushion the collision, as something, a surface that was smooth, shiningly red, somehow liquid, broadened out to receive him. He struck.

Most of his senses were torn away. But he remembered motion, tumbling motion, as if he were in the grip of a sucking current. He was sucked into darkness, rushed along at terrific speed—and then, borne by the same current, went shooting upward at terrific pace.

The upward pace stopped, he seemed to fall back onto something soft and spongy, and he was quiet.

For awhile, he thought he must have gone blind. There was no light. His mind worked sluggishly. Under him, his senses told him, there was a spongy, elastic surface. He raised himself by his gauntletted hands, sank up past his forearms. Nothing spongy then; a liquid, buoying him up.

"Gull," he muttered.

No answer. Sturm seemed to hear an oppressive, boxed-in silence. He reached dully into one of the sealed pockets built in one of the sleeves of his spacesuit, extracted a flashlight. He played the beam around. The tiny circle of light made one insignificant hole in the absolute darkness. He was lying on the surface of a pool.

though—a pool composed of a heavy, quiet, darkly yellowish substance. But the yellowness was merely the reflection of the beam—he had no way of knowing the true color. But he suspected it would be silver.

It was a roughly circular pool, a body length and a half in diameter. The pale beam picked out cracked, pitted walls which rose in unevenly vertical lines. The flash traveled up ten, twenty, thirty feet, revealed a few narrow ledges. Sturm got an impression of walls narrowing together, but the beam showed only dark obscurity higher up.

Gull Norse was lying rigid a few feet away. Sturm thought to himself, "I've got you, now what do I do with you?"

Gull stirred at that moment, floundered around. Sturm inched toward him by pushing with his hands. He brought Gull to a sitting position. Gull's eyes opened slowly, then narrowed with sharp awareness.

Sturm told what the flash had picked out.

Gull, interest showing in his eyes, said: "A quicksilver pool. I thought we sorta hit something soft. Lucky break."

"I *don't* think we landed in this particular pool," Sturm said. "We were out in the open when we hit. Then I remember moving, as if we were in a current, being sucked along. Looks like we're closed up tighter 'n a drum here. No openings in the walls, near as I can see."

Gull scoffed. "Listen to him. If there aren't any openings in the walls," was his reasoning "how did we get here? We better take a good look around."

Gull moved around the narrow circle of the walls twice. He was much discouraged. "Nope, not an opening. You're right. Then we came up from beneath."

Sturm hesitated. "From beneath?"

"Sure. Through a fault in the rock."

"Well, maybe. I don't get the picture though. Apparently we hit in a quicksilver lake outside, which is connected with this pool. This pool is quiet though. What would cause a current, a flow of quicksilver from the lake to the pool—and a current that's apparently stopped flowing?"

Gull's thick lips worked over each thoughtfully as he stared at Sturm.

"Hey! Wait a minute—" His tone was startled. He stopped. A quizzical light appeared in his eyes. He stuck his tongue in his cheek, making a bulge. "Naw," he said, "I guess not."

Sturm waited a moment. He said politely, "Any harebrained idea might lead to something at this point, Gull."

"Naw, it wasn't any good. You know, I think we better scale the heights. Make an ascension, et cetera, and see what goes on up there."

He jerked his helmeted head toward the rising walls. Sturm quietly agreed. He was beginning

to distrust Gull again. More, he was distrusting himself. A sentence started going through his mind: "The quick brown fox jumped over the lazy dog. The quick brown fox—"

Gull was quick. And he was foxy. Maybe he was drawing himself up to jump— But how? Yet he had "jumped" out of the Q-type force-field.

They climbed the walls without difficulty, now and then stopping to rest. True enough, the walls continued to narrow. Forty or fifty feet up, Sturm no longer could see the pool. It merged into dark obscurity. Ten feet farther on, they came to a "roof," a smoothly domed continuation of the black basalt walls.

Gull, sitting on a ledge opposite Sturm, looked at Sturm wordlessly. Sturm looked back. Very quietly, he laid the flashlight down, and for several minutes there was no sound. Sturm was bitter. The truth was obvious. He said finally:

"We're bottled up."

"Yeah, I guess so. Bottled up is right. Ever see anything like it? From the fire into the frying pan."

Gull thought that over. "Yeah," he muttered. "Yeah. That's a good thought. From the fire into the frying pan."

Sturm detected something odd about Gull's voice. Gull's teeth were chattering. He suddenly directed the flash on the big man's face. Gull's face was blue with cold. Sturm directed the flash on Gull's hips. He reached across and flipped up a tiny lever.

His voice was sharp. "Didn't you know you were freezing? Your thermostat was off."

Gull grinned. "Aw, I did that on purpose, Sturm. I wanted to see what the climate was in here. Must be below zero. . . . I'll tell you what I've figured so far, Sturm. This bottle we're in is a sort of volcanic bubble. The opening is down under the pool of quicksilver. We couldn't begin to dive under and find the opening—the quicksilver's too thick, weighs too much. So we better forget about getting out from below, and concentrate on blowing out the bottle's cork."

Sturm was vainly trying to read Gull's mind. "Wait a minute," he said sharply. "You wanted to see what the climate was. Why?"

Gull was amiable. "Doubting me? I'll tell you why. There's air in here—volcanic gases that've been trapped in this bottle for a couple million years maybe. The air is cold. That means the walls of this bottle are cold. So what? Why, so we can dig our way out of here with a flame pistol.

"Here's what I mean: As we come floating down from the ship, I seen a lot of rocky hills around here. Low hills, too, maybe sixty or seventy feet. Not higher than this bottle. That means we're pretty close to the top of one of them hills. The rock is cold and if we use the flame pistol the heat'll make it chip off pretty fast.

Then we can get out of here. I'll show you."

Gull came to his feet with vigor. He took up his flame pistol, adjusted the valves. A long smoky flame leaped out. Gull adjusted the valves again and it settled down to an inch-thick sword of flaming, violet-blue energy. Gull directed this against the dome of the natural bottle, held it there.

Sturm, watching with interest, felt a solid wave of heat strike him before the refrigerating apparatus in his spacesuit took hold. A few minutes later, there was a clean cracking sound. A foot-long slab of rock two or three inches thick cleaved itself away, broke into fragments and fell. Sturm heard them strike the surface of the mercury pool. Gull grinned with triumph.

"See? Why do I have to think of these things?"

Gull, the shaggy bear of the space lanes, was happy. He began to sing as he worked. His voice roared, shook the very walls in their age-old emplacements. He had a remarkable bass baritone. He sang these words:

"Said the man-eating shark to his wife
In their bower so quiet and shady,
Although I am a man-eating shark,
I would not refuse a lady!"

Sturm, sitting with his knees drawn up, laughed. "That yours, too?"

"Naw. That's an oldie. But here's one I made up last year. Soon as you put me in jail where I'll have lots of time, I'll write it up and I'll bet that there magazine *My Stars!* will buy it." Another slab of rock, a little smaller, chipped off. "Listen," said Gull, and recited:

"A Martian wolf saw her whelp chasing
A hunter, and cried, 'Oh, how rude!
Junior, I've told you so often
Never to play with your food!'"

For about two hours, Gull Norse, the fabulous, sang and recited verses new, old, and of his own creation. Inflexibly he pursued his task. Heat poured from the growing hole in the dome of the bubble. Sturm's refrigerating apparatus was working hard, and to conserve its energy he dropped to a lower ledge. There, completely without intending to, he went sound asleep.

He awoke. The first thing he thought of when he awoke was that Gull Norse had been crooning softly just as he fell asleep. Crooning with a sinister softness, he thought. Maybe Gull *did* have plans to—jump.

He came to his knees wildly, his stomach a cold knot. His relief was indescribable when he looked upward, saw the fierce brilliance of the flame pistol, saw Gull silently working at the growing hole. A few pieces of basalt fell past him as he watched. The tenseness went out of him, he smiled a trifle sheepishly, and worked his way to where Gull was working.

Gull grunted, grinned at him preoccupiedly.

"You been sleeping a couple hours." The cavity was about

three and a half feet deep now. "I figure you better go sleep a couple more. We'll work four-hour shifts, eh?"

Several big chunks fell from the aperture. They struck the metal pool below. Gull was holding his head to one side, as if listening to the soft sound as they struck. His manner was oddly tense.

Sturm said slowly, "You know, Gull, I don't think I'd better go to sleep."

"Yeah? Why not?"

"I don't trust you. You might get that hole bored through, crawl out and make your getaway. That's what you've got in mind, isn't it?"

The big man's unshaved face held a wounded expression. "Aw, now. Ain't we in this together? Buddies, pals, comrades and all that sorta gaff? Besides, where would I escape to?"

"You'd use the ship to escape in. If we fell in a mercury lake outside, the ship did, too. It's floating out there and it's probably no worse damaged than it was before it fell. It'll only take fifteen or twenty minutes at the most to pry open the fused jet-ends, dummy up some new grid-connections from the fuel tanks and then take off."

"You think I'd go away and leave you here?"

"I sure do."

Gull's eyes turned humid with unshed tears. He told Sturm, "When you know nobody in this wide universe trusts you, Sturm, it makes you feel bad." He sniffed. "Guess it's my own fault."

Sturm laughed. "Cut the act. Give me that flame pistol and I'll take over for awhile. I don't care what you do. *You* go to sleep if you want to, but *I'm* staying awake. At least you know I won't run off alone—not without you."

Grumpily, Gull thrust the still-flaming pistol at him, muttered to himself and let himself down to the next ledge, and the one below that. Sturm immediately attacked the cavity, tightened the valve and got still a hotter flame. Around him, he knew, the atmosphere must be broiling hot.

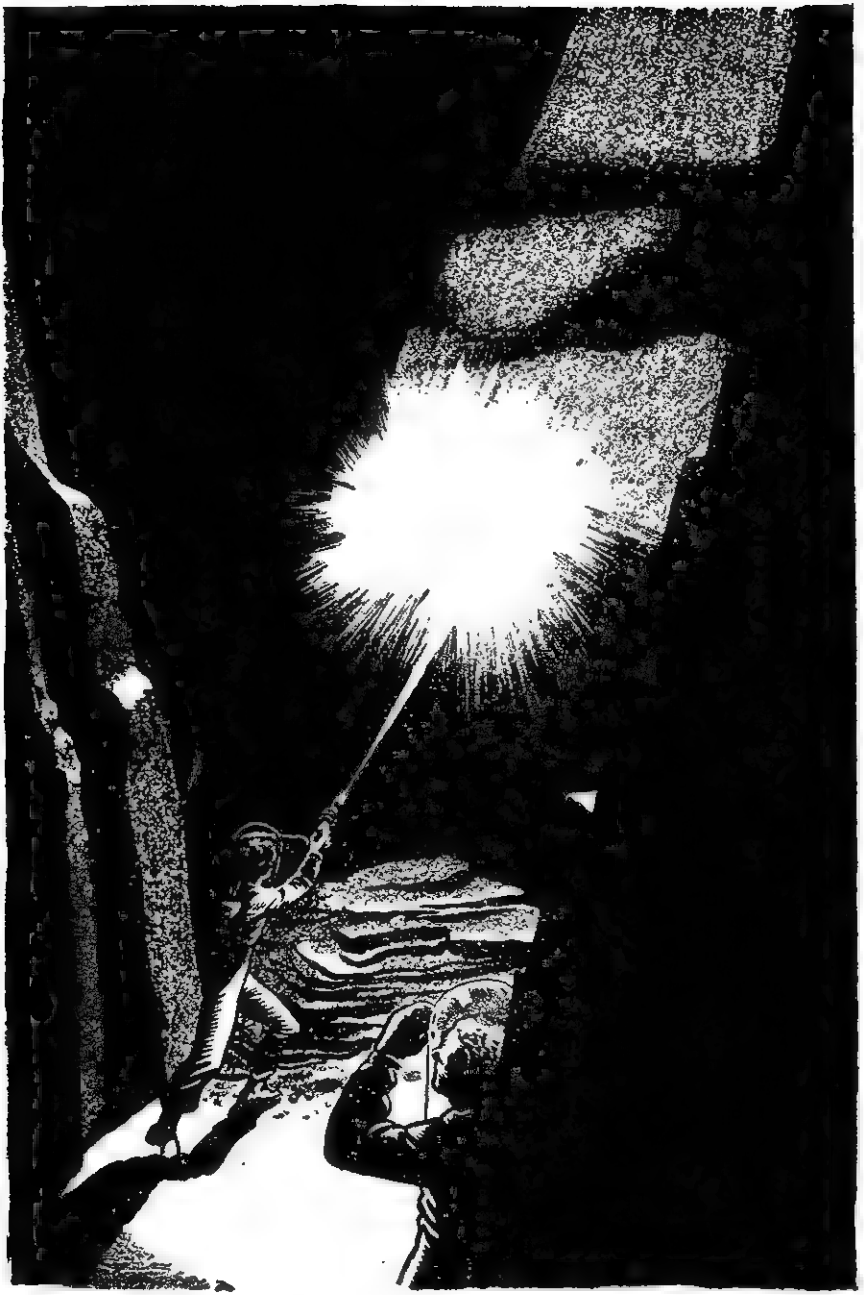
A few minutes later, he casually looked down the widening walls of the "bottle." He couldn't see Gull.

"Gull," he said sharply, peering down.

"O. K.," Gull said resignedly. "I'm down here a couple ledges below the one you was sleeping on. I feel awful bad, Sturm, and I guess I won't sleep, just thinking about things. In case I do go to sleep, though, don't you keep on yelling at me like I was a spoiled brat crossing to the wrong side of the street."

His voice grew drowsy toward the last. Sturm smiled. Gull didn't realize how much like a spoiled brat he sounded at times.

As has been said, if there was one thing Sturm was good at, it was tenacity. He enjoyed being tenacious. Whether he knew it or not, the theme which governed his life was that contained in the maxim, "A journey of a thousand



miles begins with but a single step."

He had very little knowledge, philosophically, of the mechanical advantages given by the lever in the matter of human affairs. Jujitsu would never have appealed to him, for instance, if it had not been a required subject at Decimal Point. Therefore, he was not familiar with the mental jujitsu men of Gull Norse's type use to such great advantage: namely, using the most subtle means of employing others to do their work.

Sturm was now on the long arm of the lever, swinging through a wide, hard arc. While Gull had manipulated himself onto the short arm, where his job was being done for him without using his personal energy.

Not only was Sturm doing Gull's work, he was actually leaving Gull free to pursue a plan which was being brought to completion by Sturm's tenacity.

Sturm didn't know that. It gave him a strange feeling of elation every time the cavity leading to freedom deepened itself by another inch. An inch is only part of a foot. A foot is only part of a mile. Sturm would have been contented to work on the cavity for countless days, if he felt he was getting some place.

He became so absorbed in the job that time, even the situation, lost meaning for him. He worked two hours, three, then four, without once taking the flame from the growing aperture.

Then something struck the wrong note.

The fragments cloven from the solid basalt aperture were not falling and hitting softly. They were not plopping down onto the surface of a mercury pool. They were striking a solid, unyielding substance.

The significance of that false note struck with shattering revelation. He stood motionless, fighting the suffocation that rose in his mind. Then he snapped off the flame, dropped to one knee, whispered hoarsely,

"Gull!"

There was no answer. The name came out sharply the second time. Then Sturm shouted madly with the full power of his throat, "Gull!"

There was not the whisper of an answer, only the lonesome echoes of his own voice. He began to shake with a throttled hatred of himself. His hand shook as he dropped the flame pistol in its holster, began to let himself with a reckless lack of care down the walls of the bottle. He searched every ledge with his flashlight as he descended. When he was three quarters of the way down, he knew that Gull, the quick brown fox, had jumped over the lazy dog.

Gull Norse was gone.

After awhile, moving as if a nightmare had struck with chill abandon, Marc Sturm crept farther down the walls. His flashlight picked up no silvery sheen of placid

quicksilver. Where had been the quicksilver pool there was nothing. The quicksilver pool was gone, and the bottom of the pool was a smooth, steeply sloping ledge of basalt leading down to a point on the rim of the bottle.

There was a smooth, circular aperture at the bottom of the slope. Like a tunnel. Gull Norse had crawled through.

How long ago? Sturm had no way of knowing. He had been conscious that something was wrong long before he realized what was bothering him. The deadly stupor in his brain kept him moveless for long minutes as he stared at the cavity. He finally did move, reached the slope, and allowed himself to slide to the cavity.

On hands, on knees, slowly at first, then more quickly, he entered the tunnel. It was apparently a tunnel which would give forth into the mercury lake outside. In his mind's eye, he could see Gull Norse, already at work prying open the jets, getting ready to take off. Suddenly the full meaning of what had happened struck him. He went faster, as fast as his horrified thoughts.

And the unexpected happened.

There was a strange, liquidly articulated sound. The "pop" such as a champagne bottle makes when its cork is removed. Hell broke loose. Lieutenant Marc Sturm did not know what happened—except that he was hurled back along the tunnel, his flashlight torn from his gauntletted hand by an incredible smashing force; that he was lifted at appalling speed, flung with an ear-rupturing howl of violent energies into a maelstrom where thoughts themselves were sheared away, and the mind became silent.

When Marc Sturm's senses came untangled, he saw that the planet Vulcan was below him.

Not only below, but *distant*.

Vulcan was a flat disk the size and color of a copper penny. It completely eclipsed the Sun. Sturm made a few slow computations, using the planet's diameter and its known distance from the Sun as the main factors. From that he figured he was twenty, maybe twenty-five miles above the body. He was out in the vacuum of open space.

The disk of the planet was neither decreasing nor increasing at the moment. That meant he was at that point where he was neither rising nor falling.

Yet, even as he made those deductions, the girth of the tiny trans-Mercurian planet did increase. Gravity had hold of him.

He did not then figure out why he was here, what tremendous force had thrust him explosively into space. He didn't have a chance, for at that moment a new panic laid hold of him. He saw a flash of intense silver some miles out from the planet. Intuitively, he understood what it was.

The spaceship, and Gull in it.

He would have to catch up with it. The thought came to him

coldly, incisively, without emotional disturbances. The impossibility of the task did not occur to him. That it would have occurred to most other people in his position he did not realize. But he had to do it, else he would be marooned on a planet which, according to the scientists, held "nothing of interest." Those scientists had been in too much of a hurry to get away from an uncomfortable climate to discover the mercury lake. But their phrase, "nothing of interest," meant at the very least that there was no life, no growing things—no food. The Robinson Crusoe act was out. Therefore he had to reach the ship.

There were certain advantages with him. For one thing, Gull's course was at an acute angle of thirty degrees to his line of fall. Using the reactive powers of the flame pistol, Sturm could cross Gull's trajectory before or when Gull reached that point in space. For another, the flame pistol would not have to bear the full brunt of the load, because gravity would take care of the necessary downward motion. He figured he should meet the ship fifteen miles out from the planet, which meant he had to get closer than he was anyway.

He unholstered the flame pistol, set its aperture to rocket-jet size, and blasted. The first blast made such a difference in his present vertical course that the baleful edge of the Sun peered over a rim of the planet. The second blast put him into the full view of that incredibly malignant furnace. There was no help for it. He pulled the thick blue filter down over his helmet, and steadily gained headway, his overworked refrigerating mechanism issuing its vibrating hum of protest.

Anxiety tore at him the last few moments. He wondered if Gull could see him, or if Gull were using the single vision-plate that was still working merely for a forward view. At any rate, Gull had done a hurried repair job on the ship, for it was traveling with the labored toil of an old man walking uphill. It was off-keel. The body of the ship leaned at an angle to the line of flight. Sturm saw that when it was scarcely a mile away.

There was a moment toward the last when Sturm went frantic, knowing he would overshoot the mark. There was another moment, as the patrol ship came rushing along, that he knew it would breeze on past him. But there was the moment that counted, as he fired countless panicky bursts from the flame pistol, when he knew he was going to strike the target as squarely as was necessary—and seconds later did strike it.

He hit broadside on. He struck with such force that he couldn't see how Gull could help but have heard him. He grabbed at a stubby, projecting periscopic eye, hung on through a daze of pain and smashingly emptied lungs. But he was here.

It had taken him forty minutes. He knew that another ten or fifteen minutes would have been fatal, for

his refrigerator was working at a task it had not been designed to perform. It was about to burn out. Minutes later, the solid phalanxes of heat marching in such violent profusion from the tongued Sun would have boiled the blood in his veins.

There was still danger of that. He therefore crept along the flanks of the ship, inched down over the bulge of the nose, taking care not to get caught in the eyepiece of the two periscopic eyes whose lenses weren't shattered. He was in shadow now. He lay there, relieved, yet he knew that a nerve-shattering vigil lay ahead of him.

At this velocity, it would take the ship twenty or thirty hours to get out of the boiling zone. Sturm had to wait until then before he put his plan in motion. Even then, the Sun's heat would be a mighty, destroying thing, and he would be able to work only a half hour at a time. But the job had to be done. Meanwhile, he must wait.

It was forty hours before the ship left the rim of the boiling zone. Marc Sturm felt like a mere husk of a man. He had chained himself to a grab rail, he had slept a few hours, he had sucked water from a tube in his suit, but he hadn't eaten. In a full gravity, he would not have been able to move. But he did.

He again crawled into the full glare of the Sun, to the very stern of the ship, where he again used his flame pistol. He was attacking the jets. He was going to fuse them right back up again.

He worked for thirty minutes at a time. His refrigerator was already deficient, for at the end of that time sweat began to form. He would then crawl back into the shadow again.

He kept this up for interminable hours—crawling sternward, then abaft, sternward and abaft.

It took him three hours to close one jet out of the six that were working. His process was simple but awkward and difficult. He played a white-hot flame on the stubby ends of the jets until they glowed with a violet intensity that would have crisped flesh in seconds. Then he put the metal heel of his spaceboot on them and pressed. Several such operations soon squeezed the lips together. The pointed streamers of flame erupting from the jets would thin out to nothing.

It took him a little over twelve hours to render four jets useless. During that time, a stupefying hunger wrenched his vitals, a terrible exhaustion threatened to destroy his volition toward movement. Each movement, in fact, seemed to come from his will rather than his body.

In the intervals when he was in shadow, he lay on his back, staring with burning, red-rimmed eyes at the stars. His hands were wrapped around guide rails with the grip of death. He thought he might be a little delirious when he saw the stars subtly change pattern—and there were the constellations of Lieutenant colonel Susan Quincy; of Uncle Jim Post; of Gull Norse, the fabulous. There was a clear-

cut psychological portrait written right on the skies, and sometimes it told him he didn't have any brains. Then in the same breath it would say, "But, Buddy, you sure got guts."

That made him feel better, and he would start crawling back to the job, though the various things in his body were telling him he was a little bit crazy in the head for thinking he could move at all. But he finished the job—four jets—and went back to his resting place.

He slept. In his sleep he saw Gull, so terribly unhappy when he saw his jets blanking out one by one. Gull Norse had only two jets. He had just enough power to get to the little errant asteroid where Sturm had, days before, arranged a crash landing. That's where he was going, so he could repair the ship again. Sturm went more soundly toward sleep, remembering with a dutiful sigh that he had strapped himself to the grab rail; but not remembering why he had fused the jets.

There was a jar which shook Sturm awake. His eyes snapped open. He fought to bring his thoughts back to normal. The little links of the chain of memory fell into place, and he had the story. Not only the story, but revived strength. He was abruptly frantic. He turned over to hands and knees, unstrapped himself, got unsteadily to his feet.

The ship had landed. And true enough, it had landed on the little asteroid.

Panting, almost retching with weakness, Sturm urged himself across the top of the ship in a weaving stagger. He got amidships just in time to look over the edge and see the air lock opening. Gull Norse's big spacesuited body came out. Marc Sturm jumped without a second's forethought. He landed on Gull's shoulders. With the same motion, he brought the butt end of the fifteen-pound flame pistol down on that part of Gull's spacesuit where it touches the back of the head. He brought it down with every ounce of strength he had. It hit solidly. Gull Norse didn't utter a sound. He crumpled up. He fell straight down on his face, arms loose strings draped on the ground, legs tangled up like those of a dead man.

And Sturm fell beside him.

Again he knew he must move, though. He did. He went into the ship, rifled the lazarette amidships, found some coils of rope, and made thirty different turns around Gull's body, starting at the ankles, before he tied a Gordian knot. When Gull woke up three hours later, Lieutenant Marc Sturm had drunk three cups of coffee, some soup, had pried open the jets again, and the ship was on the way to Mercury, seven hundred thousand miles distant.

Gull's eyes were tiny slits.

"What you think this is, Sturm, a second-rate tele-audio program, tying me up like this?"

Sturm's smile was wry. "I guess my methods entail sheer brute force rather than brains, Gull. Anyway,

you stay tied up until we get to Mars. We're on the way to the Mercurian garrison to get a new ship first, though. Now, while we've got some time, why don't we talk about that bottle? How you tricked me, for instance— I've told you how I tricked you."

"I'll say you have," Gull muttered. His head turned continuously back and forth, giving the impression of a leopard pacing a cage.

He was unable to move more than a few muscles. In addition to the profusion of ropes, chains bound him full length to the deck plates.

Gull muttered, "Wasn't anything to it. Just a matter of atmospheric pressure in the bottle, of the planet's libration, of the Sun's heat. That mercury lake was right in the middle of Vulcan's twilight zone. Every fifteen or twenty hours the planet made a complete wobble. That meant for half of that time the lake was right out in the full glare of the Sun—first moving out and then moving back. The other half of the wobble it moved through the cold zone. There were two extremes of heat.

"You can figure what happened when a few thousand degrees of heat poured straight down on the lake. It heated up fast. It transmitted its own heat to the atmosphere in the bottle. The atmosphere in the bottle expanded just as fast, pushed the mercury pool back into the lake outside. Not far enough to lose its atmosphere, though.

"We fell into the lake just as it moved back into the cold zone. Y'know, when superheated air cools, it cools fast, like that. It contracted with a bang. It sucked mercury right back up into the bottle, and we were sucked up with it. Remember I tested the temperature of the atmosphere in the bottle. It was cold. So I figured I was right."

Gull stopped, scowling. His good nature was gone. "I guess you really got me this time, lieutenant."

"I guess so."

"Well, then figure it out yourself."

Sturm said ruefully, "I guess it's all figured out—except a few things. I suppose Vulcan's lack of atmosphere helped. No diffusion of heat. When the lake got into the Sun's rays, there must have been several thousand degrees of unadulterated heat pouring on it. Probably the lake came near close to boiling, all the way through. When it got in the cold zone its temperature changed to the other extreme—maybe got close to absolute zero.

"Come to think of it, the lake would evaporate after awhile, wouldn't it, Gull?" Sturm rubbed his chin. "Maybe it's fed from an underground well. Maybe."

He sat there puzzling it out. The jigsaw took shape.

"I guess I was a dope, Gull—running true to character. You used me by making up a tall story about a 'cork' we could chip out with a flame pistol. The only reason you wanted the flame pistol working was to superheat the volcanic gases in the bottle—same as if the mercury lake were in the Sun. The gases expanded, pushed the

quicksilver pool back into the lake outside. You crawled through the tunnel, found what was left of the pool, forced yourself under a few feet by using your flame pistol, then went shooting up to the surface. And all the while, I was heating up the air so you could make your getaway.

"In a way, that set-up was vaguely similar to a big thermometer or barometer. Bet you could duplicate it in a laboratory, eh? Or on a stove, maybe. Put an open mouth jar mouth-down in a shallow pan of water. Boil well. Turn off heat. Hm-m-m." He stopped.

After awhile, Gull grinned in sickly fashion. "You sure were a sucker," he said. "Only thing is, like the papers say, you always get your man. Guess I gotta respect you. Tell your chief for me."

"I'll do that."

"Tell him . . . say, listen, Sturm, tell him I wasn't intending to leave you back there. I was gonna radio SAG and tell 'em where you were. I was gonna tell 'em that, honest to God.

"Of course, how was I to know that 'cork' was actually there and the gas-pressure would blow it off and send you shooting up into space like a cannon ball? But my intentions were good. You believe me, Sturm?"

Sturm said, "I think I do believe that, Gull."

Gull's face wreathed with flamboyant smiles.

"Sturm, that makes me feel mighty good. You're one of the best guys in this here Solar System, don't forget it. And you know what I'm gonna do soon as I get in jail? Sturm, I'm gonna lay plans to lead a honest life hereafter. I'm gonna plan to become a great humanitarian — help the sick and needy, the halt and the lame, and all that sorta gaff. And in my spare time, I'm gonna write poetry. Sturm, I'm gonna become one of the champeen light-verse writers of all time!"

Two days after Marc Sturm deposited Gull Norse at the Fontanaland detention barracks, and received a receipt acknowledging his safe delivery, he stepped from the elevator in Satterfield Hotel on his way to report to Uncle Jim Post. When he handed his key in the clerk at the desk gave him an ethergram, saying,

"Lieutenant—" He caught himself, his eyes widening as he saw the five glittering, star-studded stripes on Sturm's right shoulder.

"Pardon me—I mean captain. Captain Sturm, the Interspace Radio Co. people asked me to inform you that this ethergram was sent from an unidentified spaceship which had left Fontanaland a few hours before."

Sturm felt a chill presentiment. With stiff fingers, he tore the envelope, fumbled open a pink slip. The ethergram was unsigned. It was a four-line jingle. It read:

As you and the leopard are opposite types,
I leave you with these thoughts:
Riddle, riddle, you've changed your stripes,
Can the leopard change his spots?

Fifteen minutes later, absolutely wooden-faced Sturm stepped into the presence of Colonel Post.

Post was obviously controlling himself only by a mountainous effort. He said chillingly, "Captain, allow me to congratulate you on a brilliant piece of work. Since our last conversation, you've given me ample reason to be proud of you."

"There was nothing brilliant about it, sir. As I've explained to you, I'm afraid I don't major in brilliance."

Post made a grinding noise of rage with his teeth. "I could name a few other people—namely, the commanding officer at the Fontanaland barracks—who don't major in brilliance either; or anything else. Captain Sturm, I have another assignment to hand you. *Now.*"

"Yes, sir?" Sturm lifted a dark eyebrow.

"Captain Sturm, this morning Gull Norse escaped Fontanaland."

"Yes, sir?"

"Your work has gone for nothing. Therefore, I'm setting you on Norse's trail again."

"No, sir."

Post stiffened. "What d'you mean, 'no, sir'?" he snarled.

"I differ with you, sir. My work hasn't gone for nothing. I've received a deserved promotion. Also, according to the rules and regulations of the SAG, sir, as I have just finished an assignment, I am permitted to take time off for a honeymoon if I so desire."

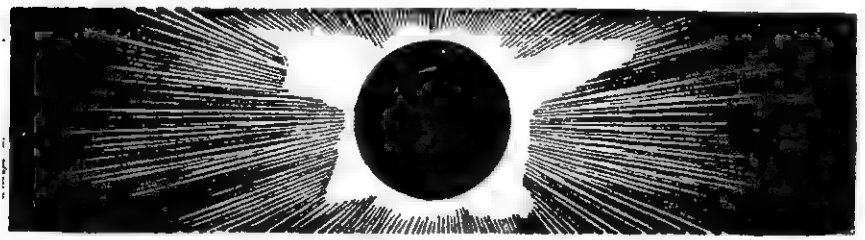
"A honeymoon? Why, confound it, don't you go springing rules and regulations on me. According to the rules, I can postpone your marriage if there's urgent business to be attended to— Ah, so you've seen Susan?"

Sturm smiled slightly. "I saw her yesterday afternoon—when we were married."

Post groaned, groped to a seat and breathed hard for a moment. "Congratulations, captain," he muttered. "And offer my best wishes to the bride. But what are we going to do with Gull? *What are we going to do with that man?*"

"I think, sir," said Sturm politely, "that he must have been reading too much poetry lately. Namely, the one that begins, 'Stone walls do not a prison make, Nor iron bars a cage—'"

THE END.



Brass Tacks

Year's Best

Dear Mr. Campbell:

Here is my selection of Astounding's Ten Best Stories for 1945:

1. World of A, by A. E. van Vogt.
2. The Mule, by Isaac Asimov.
3. Nomad, by Wesley Long.
4. The Mixed Men, by A. E. Van Vogt.
5. Destiny Times Three, by Fritz Leiber.
6. First Contact, by Murray Leinster.
7. Giant Killer, by Bertram Chandler.
8. Beggars in Velvet, by Lewis Padgett.
9. Last Outpost, by Ross Rocklynne.
10. Special Delivery, by George O. Smith.

Some more stories in Van Vogt's Mixed Men series would be welcome, if he has any up his sleeve. Even the Foundation has shown signs of becoming interesting again—if he can keep them up to the standard of "The Mule." Let's have more of these, too. Frankly speaking, this year's list has little to be very proud of, except the top two or three.

We can hope for a revival of the old Astounding sometime next year. Incidentally, you must get quite a number of votes on the Ten Best of the Year, and presumably you make up your own tabulation, so why not publish it? I'm sure we'd be interested. And when you start considering what format to return to when paper is again available, I throw in my vote for the type used from February to April 1943, plus better illustrations, of course, and minus the border around the cover.

It is interesting that almost all of the authors listed above have been brought up under the Campbell aegis, and that most of the old standbys of years past—I almost said hacks—have largely vanished. I believe Astounding is the better for it. Of course, some

of them have never appeared again after a few brief outbursts, as M. Schere, Kent Casey, John Berryman, and so on, but the large part—Heinlein, Van Vogt, Del Rey, de Camp, and others—have really developed into what is now your first line. Other magazines have attempted the same sort of thing, but with consistently less success.

As for the covers of the year, January, May, November, and October, in that order, were pretty good—plus the one that illustrated "Dead Hand," whichever month that was. The rest of them, however, were poorly drawn, dull, or unscience-fictional. And the illustrations? Well, let's not speak about them. On the other hand, it is undoubtedly better to be restrained than to go all out for sexy covers and illustrations for no good reason.

As for this year: The January issue was pretty good, but not as good as December. The cover ranks a C, I should say, and the illustrations the same.

1. "The Fairy Chessmen": B. I have seldom read a nightmare so well sustained and so gripping through an entire story. This promises to be most interesting.

2. "Veiled Island": C+. Not too convincing. It could have stood another polishing. One still feels the whole thing had no more right to happen on Venus than it did on Earth—and it obviously did not, on Earth. Characters stereotyped.

3. "N Day": C. New author? If so, he has more promise than the above, since he seems to possess a little more imagination. "N Day" would have ranked higher than "Veiled Island" except that I liked the Homo Superior idea.

4. "Fine Feathers": C—. O. K., Smith. Enough.

5. "The Plants": D. Little point to it. It is my opinion that the Copernicus would have been smashed to bits in such circumstances.

6. "A Matter of Length": D—. I don't see that length had anything to do with it. Furthermore, the travelers would have speeded up or slowed down to the time of the planet quite automatically without noticing it. Into the bargain, I am getting tired of stereotyped supermen who are persecuted by the rest of the human race. The thing that would probably happen is that they would be so completely ignored that even if they wanted people to know they were supermen, no one would believe them.

Articles of little interest. Editorial *very* important and one of the few I have read that shows anything like a grasp of the scope of the thing that has happened to us. I have showed it to some friends who wondered why everybody was so up in the air about the atomic bomb when we were the only country in the world that possessed it, et cetera. People somehow manage to be consistently thirty years behind the time, it seems.—D. C. King, 20 Snell Hall,

University of Chicago, Chicago 37, Illinois.

Watch that "Astounding"! As the magazine becomes less astounding, you'll find the "Astounding" becomes less!

Dear Mr. Campbell:

I believe my sister, under the name Ralph Dighton Jackson, has been writing you occasionally and sending you science-fiction poetry. She was quite angry when I returned after three and one half years overseas and didn't bring the copies of Astounding I had been receiving on my subscription. She was somewhat mollified, however, to find that I had been circulating my copies till they were worn out. I made up a "distribution list" on my own station and when it had run through that—from the adjutant who was a lieutenant colonel to some buck private in the guard house—then I sent the remains to a friend in Wales. When I was in England I saw his name on a letter in Brass Tacks and started writing him. He told me that he was unable to get Astounding, so he was very glad to have me give him mine and after he read them he started them on the rounds of all his friends. All in all, those copies got the type read right off the page.

When people ask me what science fiction is I tell them, "Oh, it's impossible stories like super planes that will carry a tank or is armed with a cannon, or rocket antitank guns, or atom bombs!" It's a terrible thing to see science used for destruction, but it certainly has vindicated the science-fiction fans.

Could I make a suggestion about your excellent magazine? Bearing in mind the fact that Astounding is read by people of intelligence and imagination rather than as a "sensational pulp" magazine, why do you keep the name "Astounding"? I know that among its readers the name is the hallmark of the best science fiction, but to the newcomer it sounds a bit cheap. I have been reading science fiction for sixteen years and am an avid fan, but the only magazine I read is Astounding—and *Unknown*, when that was published—because I don't think the rest are worth bothering with. In this period I have converted many others to reading sf but have always had the handicap of their thinking Astounding is about on the scale of the lower western or detective magazines. If readers are looking for sensationalism they will read the crumby, other sf magazines, and if they are Astounding readers or their caliber, changing the name wouldn't lose them as readers.

When are you going to start publishing *Unknown* again?—Kingsbury T. Jackson, 85 River Street, Boston, Massachusetts.

The author has enough of a job describing the mechanics of a different era without trying to

define the vast ramifications of a social philosophy. Also, consider the sensibilities of modern censors if a really different code is described by action.

Dear Mr. Campbell:

No doubt you are not aware that your publication counts with an appreciable number of assiduous fans down here, because if you knew you would never permit that only in January we enjoy the pleasure, alas, very short cut nowadays, of reading the last ASF issue, in the special case that of November 1945.

So far so good. It would be nothing or nearly nothing to have to wait for the next issue for a couple of months, were it not for the ever-lurking danger that the next serial would be missing at all. It is what has happened to me several times: I have collected for a couple of years all the numbers that I have received, with several big holes gaping in the collection i. e. when the ASF numbers did not come in. Any remedy known? My bookstore seems to have written to you about this subject, but so far no reply came in.

Perhaps you could arrange that the shipment of ASF is speeded up a little. Perhaps even you could return to the former more elaborate standard of ASF. Who knows, the ways of Allah are inscrutable and the publishers are coming next to his prophet.

By the way, prophets. The prophetic faculties of science-fiction authors strike me as completely uncanny. The other day, I read a long-forgotten story of Venus Equilateral related with the preparation of unstable elements beyond the reach of Mendelejeff's atom list. Now, it happened that just the same morning I came across a lengthy issue about the atom bomb dealing with the preparation of Neptonium and Plutonium with 93 and 94 atom weight respectively. Coincidence or purpose? I remember having read once that an old philosopher pretended that great ideas are propagating and pervading the air and hence the apparent duplication of important inventions. There are things between heaven and earth, my dear Polonio —

Now, my dear Mr. Campbell, I wish to write about a thing long on my mind. It appears to me that all the heroes and heroines of times to come are responding to just the same codes and moral influences we are subject to. That cannot be. Conceding that mankind in general is slow to adapt themselves, there is a big difference between people five centuries apart and still more between John Doe of 1945 and a citizen of the Foundation. There must be.

That, in my opinion, is the big drawback of all SF. In spite of the progress authors concede in general to science and machinery, ethics do not seem to keep pace with it. Don Channing is behaving just so as we do and not even the slightest difference can be traced between us and a Trader, contem-

(*Continued on page 117*)

Press Association, Inc.

Measuring Rod

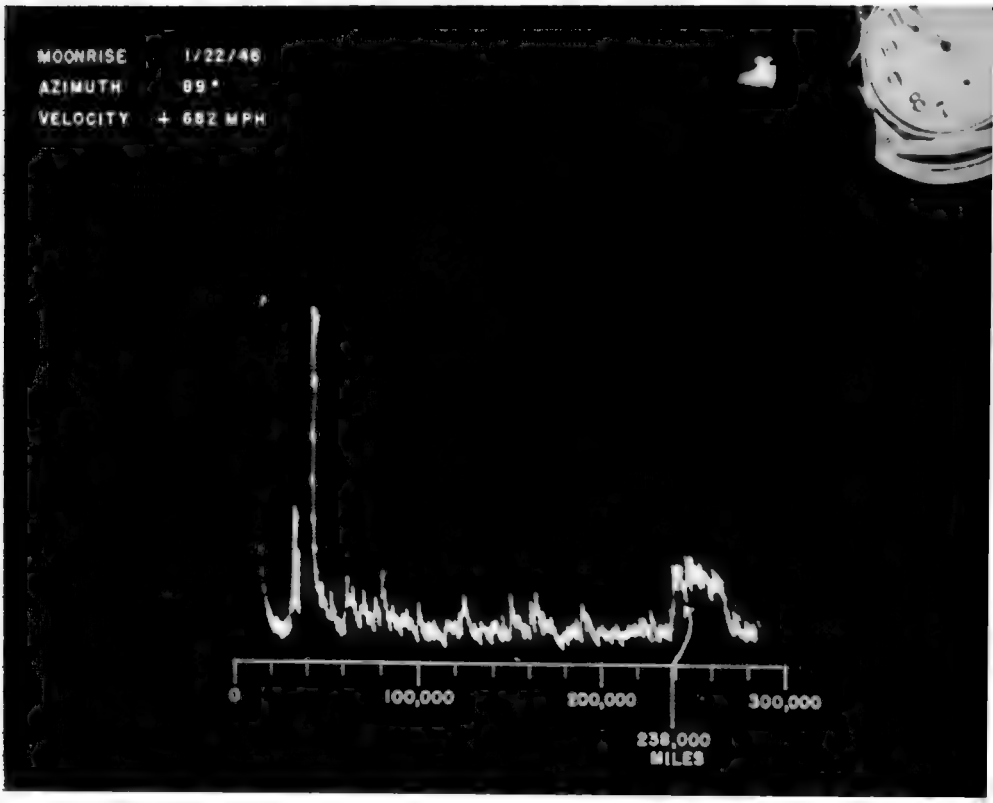
by L. JEROME STANTON

***Radar** contacted the Moon; for the first time, man had reached out to touch and feel another world. But more than a mere experiment, it means a commercial use for the Moon before man even lands there!*

". . . but even as Desperate Dan leveled his ray pistol for the flash which would send Handsome Harry into oblivion, the *Shooting Star* lurched sideways under an impulse from her automatic meteor detectors, spoiling his aim. 'Now I've got you, you unscrupulous cad,' cried our hero. 'Take that, and that—'"

Fantastic? Not any more, fellows. Once this typical scientifiction cop-and-robber scene could be dismissed by most readers with no more than a smile at the lurid imagination of the writer. Thanks to several technical developments pushed ahead among the belligerent nations during World War II, this blood-and-thunder bit of drama lies almost within present possibility. The spaceship *Shooting Star* is only the big brother of the Nazi V-2, redesigned to carry explorers across the reaches of the solar system instead of TNT from Belgium to Britain. Certainly human character and motivation have changed little in the past twenty years, or the past twenty centuries for that matter, so we have to admit the possibility of such scoundrels and heroes as Desperate Dan and Handsome Harry. The only gadget beyond our reach at the present moment is Desperate Dan's ray pistol, with which he so villainously tried to fry our boy Harry. The meteor detector is all ready and waiting to be installed, just as soon as somebody decides to build the prototype of the *Shooting Star*.

Yes, when actual exploration of the solar system begins, radar will aid the Columbus of space to detect approaching meteors and in many other ways, including interplanetary navigation, and mapping



Press Association Inc.

Fig. 1. The historic photograph of the face of a cathode ray tube, and a watch—the latter, apparently a Dollar Special. The irregular jiggling of the cathode ray trace is due to noise, the "grass" the radar operator hates. The broad heave of the line at the right was caused by energy returning from the Moon. The very thin, barely visible, but very high pip at the extreme left represents the transmitter pulse at the instant of sending. The high pip at about 40,000 miles is probably a noise pulse that happened to hit almost exactly the frequency the receiver was set to. The scale of miles is not on the radar scope screen itself, but was added to the photograph.

of planets. The money and the driving urge to build the first spaceship have not yet gotten together. However, our potential meteor detector is ready now, and can serve us to probe the space around our planet, and in a number of other ways that fire the imagination.

The Army's success in bouncing radar pulses off the moon on January 10th marks one of the earliest

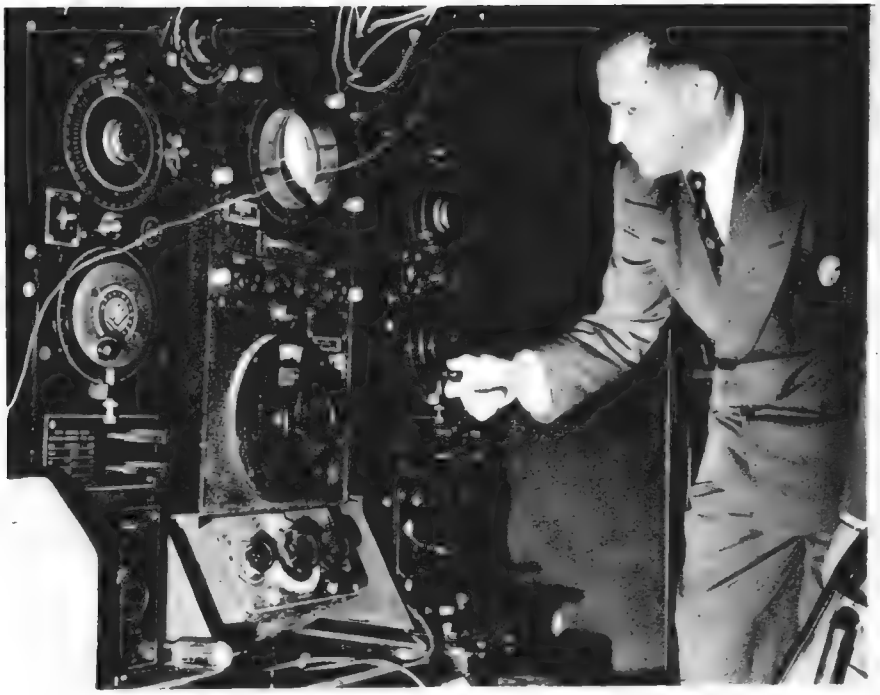
if not the first use of mankind's new electrical measuring rod to probe outside the earth's atmosphere. This remarkable feat has already touched off a flood of comment and speculation ranging from the soberly scientific to the wildly extravagant, with a few purple souls suggesting measurements of the "nearer" stars by this method. Unfortunately for astronomers and other scientists, the stars lie a little out of reach for even Army radar. Nevertheless, the thing works, and can probably be greatly improved in the future, as we shall see.

Preparation for the experiment was begun soon after the Rising Sun had been drowned in the greater flood of light announcing the advent of the atomic era in human affairs. Lieutenant colonel J. H. DeWitt and his associates in the Army Signal Corps' Evans Signal Laboratories at Belmar, New Jersey were ready on January 10th, and made their first attempt shortly after the moon rose at 11:48 a.m. that day. The first contact was indicated at 11:58 a.m., shortly after the test began. This almost immediate success was repeated on several successive nights before any official announcement was made, in order to be absolutely certain of the results. In describing the test, Lieutenant colonel DeWitt, a radio amateur and former broadcast station engineer of Nashville, Tennessee, reported he had failed in a similar attempt in 1940.

This time there was no failure. The equipment used was a modified Army radar transmitting on a frequency of 111.6 megacycles, and a brief run-through of standard radar technique may clarify the details of the experiment for general readers.

Radar, as everyone including your maiden Aunt Matilda must know by this time, works on the echo principle, in the same way that steamship men navigate among the islands of Puget Sound during periods of fog. When the visibility gets bad, as it often does in the Sound during the winter—Washington Chambers of Commerce please ignore, the author is kidding, of course—veteran skippers make out pretty well by letting go short blasts of the whistle, noting the direction from which an echo returns, and the time the sound requires for the round trip. Radar works the same way in principle, but a short burst of radio energy in a narrow beam replaces the whistle blast, and a radio receiver with a cathode ray tube indicator replaces the ear of the observer. Since radio waves travel at the speed of light, the entire system is enormously speeded up, and its range is extended. Just how far extended we cannot tell as yet, but certainly as far as the moon, and very probably a good deal farther. Venus Equilateral may not be just around the corner, but when it *is* built, the radio equipment will be ready.

Now, Aunt Matilda, being a diligent reader of the papers, also knows something of the mighty exploits of radar during the recent scuffle, when the bouncing radio waves warned of approaching bombers, located submarines,



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Herbert Kauffman, radio engineer at the Evans Signal Laboratory at Belmar, New Jersey, who first detected the lunar echo, adjusting the antenna control equipment. The antenna must be lined up on the target much as the big mirror of an astronomical observatory.

bombed invisible targets, and acted as assistant navigator for aircraft and ships over a sizable portion of the earth's surface. What the dear old lady and most of the public does not know is the long list of formidable difficulties which engineers and scientists had to overcome to make radar work on a practical scale. A stone cold $7,500,000,000 went into the development and manufacture of radar gear, yielding a handsome profit in unbombed American cities, and in engineering knowledge and experience. The payoff on the knowledge gained will continue from now on, and one of the results is the Army's recent exploit. The difficulties involved in bouncing a radar echo off the moon were the same old problems radar men had to solve in getting echoes from planes a few miles away, multiplied of course by the enormously increased distance, plus some special new snags piled on for good measure. Between the lot of them they pile up to a sizable hurdle to be surmounted, and the ways in which the individual difficulties

were beaten makes a most interesting account.

The basic factor that governs reception of radio signals is not the receiver sensitivity as laymen often imagine, but the *ratio* between the incoming signal and the noise level at the receiver input. Even the perfect theoretical receiver would have some noise in its output, because some random radio noise exists on all frequencies of the spectrum, and this, of course, is picked up and amplified just as any other radio wave on the same frequency is. Another trifling fly in the ointment is that no receiver can be built which does not produce a little noise within itself. Fortunately it is the *relative* intensity of desired signal and undesired noise which is most important. This means that any way in which we can jack up the signal at the receiver input terminals will give us better overall results, and this is one of the lines of attack employed.

Signals only a half, or at times even a third as strong as the average noise can be perceived by a good operator with certain radar systems, but for even fair reliability of perception, the signal should be in about a one to one ratio with the noise, or better. The echo indication—called the pip—shown in Fig. 1 shows a strength only a little better than one to one with the average noise level, which is indicated by the irregular wiggles in the trace between the steep peak of the outgoing pulse and the bulge of the returning echo at the right.

It is easy to see that even a small increase in the strength of the noise peaks would bring them up so near the echo signal level that positive recognition of the echo would be difficult. Now, in regular radar systems such as were used during the war, pulses were sent out many hundreds or thousands of times a second, and, of course, a new echo was returned from whatever object the radar was viewing for each pulse sent out.

Since even the Lockheed P 80 jet plane moves only about eight hundred eighty feet per second, the echoes returned from a given radar target during a selected short interval of time show up on the scope substantially one on top of the other in the same place, and the echo is thus integrated in the eye of the operator. This is exactly the way in which the series of pictures is projected on the screen in a motion picture theater to give the illusion of a single steady scene. However, the noise impulses present in the receiver output are random, varying rapidly from instant to instant, and thus do not "add up" on the scope screen. This is the reason an experienced operator can distinguish the target echo from random noise even when the average noise level is stronger than the echo itself by watching a few cycles of the trace.

Unfortunately this rapidly repeated radar pulse idea could not be used in contacting the moon, because of the 2.4 second time lag required for the pulse to reach the satellite and return. The eye does not integrate impulses received

more than about 1/15th second apart, although the brain can do this to a degree, and this made it necessary to view the trace of each individual echo separately. Photo graphic means could, of course, be used to integrate the separate echoes received in a given longer time interval, but this would slow the whole process down extremely.

It was necessary, then, to secure a signal to noise ratio better than that existing for any single selected echo in a standard radar system, yet the distance to be covered and the other difficulties inherent in such an experiment were very much greater. A good deal of scratching of heads and oiling of slide rules undoubtedly went on over this combination of obstacles, which can be better understood by a study of Fig. 2. In this diagram the earth and moon —not drawn to scale—are shown somewhat as they would appear if viewed from above the North pole of the earth. The transmitter at point A is radiating a narrow cone of radio frequency energy which impinges upon the moon in its orbit. Some of this energy is reflected back toward the earth, as indicated by the dotted line, which shows how energy can return to a receiving station at point B.

However, it is easy to see that all the energy in the beam does not strike the surface of the moon, since the angular diameter of the body averages only about thirty-one minutes of arc. The width of the beam used in the Army experiment was probably between six and eight degrees due to practical considerations in the design of directional antenna arrays. This means that the moon actually intercepted only a small portion of the energy transmitted The rest went gayly on past into outer space, and if electromagnetic theory is correct, is going yet. Goethe could write a romance about such things, but we must go on to examine the portion of the energy in which we are most interested.

If the surface of the moon was a perfect electrical conductor, all the energy striking it would be reflected back into space. Even this is not the end of the energy loss, however, for a far more serious phenomenon arises from the fact that the moon's surface is nearly spherical. Rays from a point source of energy at a great distance arrive practically parallel to each other, and are reflected at angles corresponding to the angles of incidence with the surface. This means in the practical case, that, neglecting surface irregularities, only that part of the wave which strikes the surface at a small area surrounding point X will be returned to point B on the earth, and this is true for point A, or any other point on that half of the earth facing the moon.

From this we can see that the intensity of the radio echo returned to a receiver on the earth is going to be small. Obviously the thing to do is to make the total noise level even smaller, and it is in this direction that the greatest effort and ingenuity was expended. First of all, by using a highly directional antenna which will accept signals

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The equipment in the "shack" of the first interplanetary radio communications station. The wiring still shows the fine, free hand of the experimenter operating on a project in process.

from only a narrow angle, we can greatly reduce the total amount of random noise entering the system. The transmitting antenna is of this type, and it can be used for reception as well, providing we employ a rapid electrical switching arrangement to connect it alternately to the transmitter or receiver as required. With the noise from undesired directions substantially reduced, there remains that portion of noise generated in the atmosphere directly in the antenna's acceptance cone, and also a small amount of other electrical noise of a very interesting nature, which will bear a moment's discussion.

It is now known that the sun, not content with radiating light and heat in enormous quantities, also projects radio waves at frequencies as low as 161 megacycles, and probably even lower. This radiation was measured as long ago as 1938 by Southworth, and by various other researchers since, including some recent work in Australia, which some headline-happy reporters confused with the Army experiment. Radiation from a hot body is of random phase and angle of polarization, and thus is sometimes not thought of as being the same as radio waves. Actually its nature is the same, and this fact throws light on an amusing feature of the newspaper accounts of the moon echo reception. Several of these dispatches referred to the moon echo as "proving" that radio waves could traverse outer space as well as the earth's atmosphere. Scientists have known for many years that radio waves can and do traverse outer space, and on a scale even more gigantic than the jump from sun to earth, as we shall see in considering the next source of radio noise.

This additional source of extraterrestrial static was reported by Karl Jansky in 1935 in a paper published by the Institute of Radio Engineers. It consists of a steady hiss heard on high and very high radio frequencies, where the local atmospheric noise level is not so high as to mask the radiation from space. It apparently originates somewhere in the direction of the Milky Way star system, and not even top scientists are yet able to offer an explanation. Lest timid persons interpret this as a sinister plot by some well-known gang of interstellar thugs to overrun the earth, it may be well to add that considerable study of this radiation has revealed no trace of modulation or intelligence-carrying signals of any kind. Of course, it may be intended to blow up our sun, but—

Fortunately for radio engineers, neither the sun's radio output nor the Jansky radiation is sufficiently strong to be really troublesome. Indeed, it requires very good receiving equipment with an inherently low internal noise level to receive and measure these noises.

With the narrow reception angle of the special radar antenna employed in the test, there still remains some pickup of noise from that cone of our atmosphere included in the beam. This "static" is caused

by random electrical discharges which may occur almost anywhere in the lower atmosphere, particularly in storm areas, and not even a senatorial filibuster can prevent it. There is however a way to reduce its interfering effect, and this method was exploited to the limit. This system depends on the fact that while the static is distributed quite evenly over the portion of the frequency spectrum that contains the desired signal, the signal itself occupies only a very narrow channel. By reducing the band of frequencies to which the receiver will respond to the minimum which will permit the echo signal to pass through, we can eliminate at a stroke almost all the noise, excepting the small amount which happens to be exactly on the frequency of the desired signal. This business of reducing receiver bandwidth is anything but a simple matter, but careful choice of components and proper circuit design will do the job.

There is also the matter of thermal noise in the input circuit. Free electrons in a conductor are in constant random motion, with an average velocity which increases with absolute temperature. At any selected instant the vector sum of these motions will not be zero, although of course it will average zero when integrated over appreciable periods of time. The random noise voltages thus generated are small in well designed circuits at ordinary temperatures, but must nevertheless be taken into account in reducing the receiver noise level.

In designing the receiver itself, the principal consideration is to reduce the noise from all sources preceding the first amplifying tube to a level at least lower than the atmospheric noise picked up in the antenna. In a properly designed set, the signal to noise ratio will be established in the input circuit, as described above. A tube with a very low inherent noise level is chosen for the first amplifier, and because of the amplification through this tube, the desired signal plus atmospheric noise at the tube's output are strong enough to be above the noise generated in any succeeding stage. Thus the signal to noise ratio is essentially established in the receiver input.

So much for the general difficulties in securing a usable signal to noise ratio. In the actual experiment, a number of compromises had to be worked out because of conflicting considerations, and undoubtedly further work will produce improved results. The antenna normally used for the radar was doubled in size to make possible a narrower beam, and to collect a larger amount of energy from the returning echo. This improved the signal to noise ratio as we have seen, but made the antenna rather cumbersome mechanically, and antennas for the frequency chosen cannot be made many times larger without becoming too unwieldy to be usable.

Next, the receiving system was drastically modified to secure a fantastically narrow bandwidth of

Mr. Henri Busignies, of the Federal Telephone & Radio Corporation, inventor of the high-frequency radio direction finder—known as "huff-duff" to the Armed Forces during the war, and death to Nazi subs—is now directing the research on the problem of man's first commercial use of a planet other than Earth. He plans to use the Moon as a radio relay.

about 50 *cycles!* Compare this to the bandwidth of a good broadcast receiver, which readily accepts a band of frequencies 10,000 cycles wide, bearing in mind that this radar receiver operates above 100 megacycles instead of in the broadcast band. This extreme selectivity eliminated a very great deal of the interfering noise, but introduced problems of its own which required yet more burning of midnight oil and ruffling of handbook pages and tempers.

One of the most aggravating was the matter of stability. A bandwidth of 50 cycles at a frequency of 112 megacycles means that a variation of frequency in either the transmitter or receiver of 0.000044 percent would move the signal out of audibility. The best available frequency standard is probably the transmission of the Bureau of Standards radio station WWV, with a guaranteed accuracy of 1 part in 10,000,000, which would mean a possible variation of 11 cycles at 110 megacycles. To attain this order of precision one of the most elaborate and carefully devised frequency control systems in existence is employed, constantly attended and supervised by experts, yet it was necessary in the moon experiment transmitter and receiver to hold the *combined* frequency drift to considerably less than five times this value, and this had to be done, not in a solid, permanent

building with air-conditioning and temperature and humidity controls, but with both transmitter and receiver in a temporary wooden structure on the top of a lonely hill in New Jersey. It *was* done, for periods long enough to permit successful tests, but the feat was far from an easy one.

Another complicating factor in this matter of stability is introduced by a frequency shift in the received echo signal caused by the relative motion between the transmitting point and the effective reflecting area on the moon. A glance at the diagram of Fig. 2 will show that the rotation of the planet is carrying the transmitting point A nearer to the effective reflecting area surrounding point X at a rate determined by the latitude of point A. This speed amounts to a maximum of about seven hundred fifty miles per hour at Camp Evans, but obviously does not remain constant. Instead, approach velocity decreases continuously as rotation carries the transmitter and receiver around to the position indicated by point O, and from there on around to point B and beyond the transmitting point is receding from the reflecting surface at a continuously increasing rate. Astronomers have calculated the motions of the earth and moon with great accuracy, and a correction for the varying Doppler frequency shift caused by this motion can be introduced in the transmitter or receiver automatically.

Next we can examine some other considerations which strongly affected the operation. One of these is the time lag, and the other is the type of transmitted pulse required. Since the signal requires about 2.4 seconds to accomplish the round trip, it was necessary to employ a cathode ray tube having a screen with a specially long persistence, so that the trace would remain visible during the entire period. We have already seen how the long time lag interferes with the integrating power of the eye, which is so useful in regular radar operation. Fortunately the other refinements of the system provided enough improvement in signal to noise ratio to outweigh this deficiency. Again—it wasn't easy.

The matter of pulse length might seem at first unimportant, but a moment's thought shows that here again the narrow bandwidth introduces limitations. Normal radar transmitters use a pulse length varying from .1 to 3 or 4 *micro*seconds, and this pulse is repeated several hundred or even thousand times each second. In spite of this rapid repetition, the length of time in which the transmitter is "on" is very small in comparison to the time it is off. This allows the tubes a comparatively long time in which to cool between pulses, and as a result the *peak* power can be *very* high, often as much as 1,000 kilowatts, which is the power of twenty full size clear channel broadcast stations.

The pulse length used in the moon transmission was varied between 0.2 and 0.5 *second*. Since the pulse can be repeated every 5 seconds and

still allow ample time for the echo to return, it is obvious that the 10 to 1 ratio between 5 seconds and 0.5 second allows much less time for tubes to cool than does the 1,000 to 1 ratio between a repetition rate of 1,000 per second and a 1 microsecond pulse. This means that the peak power transmitted must be substantially reduced in order to prevent damaging the tubes. The peak power actually used in the experiment amounted to no more than 3 to 5 kilowatts.

For the larger value this amounts still to a two hundred times reduction in the peak radiated power, and it would seem at first glance that this would cause a net loss in signal to noise ratio. This is not the case, for a reason not at first apparent. Actually, the receiver bandwidth for adequate reception of the 1 microsecond pulse has to be very much greater than that for reception of the longer pulse. A little consideration of the process of transmitting pulses will show why this is so. Turning the carrier wave of a transmitter on and off for short intervals many times per second can be considered as one hundred percent modulation with an approximately square wave, at a frequency which corresponds to the repetition rate. Thus a normal radar with a repetition rate of 1000 pulses per second would occupy a band 2000 cycles wide, due to the fact that in modulating a carrier, frequencies equal to the sum and difference of the carrier and modulation frequencies are generated. This is bad enough, but another action in the pulsing system causes the transmitted wave to occupy a very much larger band of frequencies. Fig. 3 shows two pulses of very different length, with the radio frequency sine wave drawn in to illustrate the action. It is easy to see that the shorter the pulse used, the more quickly the r-f wave must reach maximum amplitude, at the beginning of the pulse, and the more quickly it must fall to zero at the end. This is shown by the steeper slope of the lines OA and OA′ representing the front and rear edges of the short pulse envelope, as compared to OB and OB′ of the longer pulse. The steeper these wave fronts are, the wider the band of frequencies the signal will occupy, and the wider the receiver bandwidth must be to accept the incoming signal.

Performance considerations in military radars used during the war required receiver bandwidths ranging from 2 to 5 *megacycles*. Comparison of even the smaller value with the *50 cycle* bandwidth used in the experimental receiver shows a ratio of admittance channels of 40,000 to 1, with a consequent increase in the amount of noise accepted. It is very plain that the best signal to noise ratio is attained by reducing the receiver bandwidth to the smallest practicable value consistent with other factors, notably stability of the entire system, and using the highest power the transmitter can safely handle in a pulse of the length required for good reception.

By employing the modifications

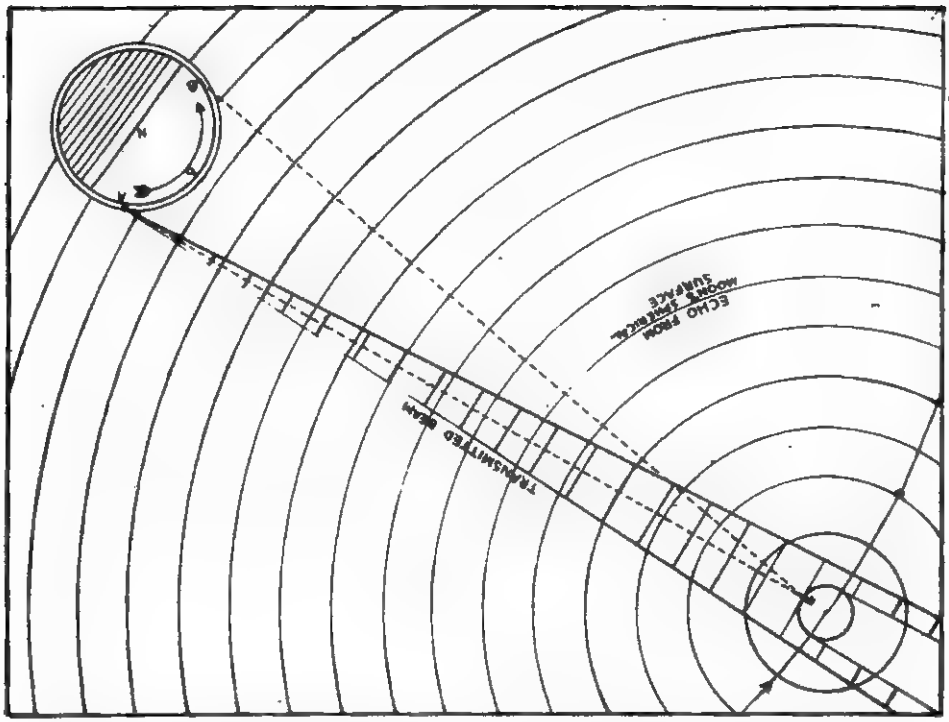


Fig. 2. The geometry of getting an echo from the Moon's surface. It's like shining a flashlight on one of those spherical mirrors sometimes used as garden ornaments. Most of the energy is lost.

and refinements of radar equipment technique just described, Lieutenant colonel J. H. DeWitt and his associates were able to establish definite contact with the satellite within ten minutes after beginning the trial. This success, attained with equipment not originally designed for such a specialized task, is certainly a brilliant achievement, and a long step forward in man's investigation of the universe around him. Vistas of rosy possibility formerly explored only by the science-fictioneer or the Sunday supplement sensationalist now emerge into the realm of practicability.

A little later we can speculate on some of these possibilities, but first let's look at a scheme being considered by an organization certainly not addicted to daydreaming or flights of idle fancy. The International Telephone and Telegraph Corporation is seriously considering using the moon as a reflector to provide an intercontinental communication link more dependable than present channels, according to Mr. Henri Busignies, who directs the laboratories of the Federal Tele-

phone & Radio Corporation, I. T. T.'s manufacturing affiliate. Startling as it sounds, this project has actually been under consideration since 1940 by I. T. & T., and considerable research into the problem has been conducted jointly by the Federal Telephone laboratories and Mackay Radio and Telegraph Co., also an I. T. & T. affiliate.

Full development of the project was shelved because of the war and other considerations, but these obstacles no longer exist, and the matter is being given a thorough review in the light of recent technical advances. The principal advantages of such a system would be the relative freedom from effects of fluctuations in the ionosphere which play such an important role in high frequency long distance communication; and the additional radio frequency channels which would be usable for long distance communication. Frequencies above 22 megacycles are notoriously unreliable for long-range communication over the earth's surface, because the ionized layers of the upper atmosphere do not reflect these higher frequencies back to the earth, except under very unusual circumstances, and thus communication much beyond "line of sight" distances is impracticable. Frequencies below 22 megacycles are useful for long-distance communication much of the time, but their operation is dependent on the fact that there are layers of the earth's upper atmosphere which are kept in a more or less ionized condition by solar radiation. These layers, several of which are known to exist under varying conditions, reflect radio waves of these lower frequencies which strike them at small angles. During conditions of normal atmospheric ionization these layers are fairly stable, and reflect radio waves back to the earth's surface at points distant from the transmitter. Unfortunately the sun's effect in ionizing our atmosphere varies considerably over a period of about eleven years with the cycle of sunspot activity, and a sudden change in the sunspot activity can cause electromagnetic storms which often completely disrupt regular radio and cable service. Such a period occurred recently, lasting from February 6th to 18th, with serious disruption of service, including almost complete blackout of East-West communication on several days.

By means of the system proposed by I. T. & T., communication by radiotelegraph could be carried on with selected stations regardless of ionospheric conditions, by using the moon as a reflector exactly as in the Army experiment. The practical problem is somewhat more severe than in merely securing a detectable echo, since the signal to noise ratio at the receiver input must be far higher for reliable communication, and a wider bandwidth must be employed for economic reasons. This latter point is an interesting one, and has a direct bearing on the practicability of the proposed link. The amount of intelligence which can be conveyed by a radio channel employing a given system of modulation is a direct function of the

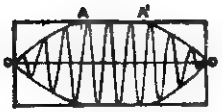


Fig. 3. The shape of a radar pulse controls the pass bandwidth the receiver must handle.

bandwidth of the channel, because all system of modulation used acts to widen the band of frequencies the transmission covers. For reliable telegraph code transmission at speeds high enough to justify setting up such a link, a bandwidth of about 500 cycles is desirable. This means an inevitable ten times increase in noise, and even to maintain the barely adequate signal to noise ratio obtained by the Army group under Lieutenant colonel DeWitt, the transmitted signal must be increased in power ten times. Even this signal level would not provide anything like the reliability necessary in commercial operation, and Mr. Busignies' calculations indicate a minimum power requirement of something over 100 kilowatts to secure operation dependable enough to justify setting up the system.

In 1940 this order of power at frequencies even as high as 30 megacycles was out of the question, but vacuum tube development has more than kept pace with other technologies, and continuous wave transmission of such power at frequencies in the neighborhood of 100 megacycles is now quite practicable.

From the operational end, simultaneous transmission and reception at both ends of a link, using high keying speeds, would permit handling a large volume of message traffic per unit of time, and the time element is important, as we will soon see. It is necessary that both stations have the moon in view during periods of operation, although, of course, it need not be night at either station. This limits the length of time any given pair of stations can communicate, and the period available will depend on the orientation of the stations on the planet. Stations directly north and south of each other can operate an average of about twelve hours out of each twenty-four, since they cross the moonrise and moonset lines substantially together. The case for stations separated in longitude is less favorable, falling to a few minutes a day for stations diametrically opposed to each other on the planet. Obviously this extreme would be uneconomical, but relaying could easily be done, with stations to the eastward transmitting traffic to westward stations, who pass it on westward to its destination when the moon reaches

a favorable position a few hours later. Delays of this order are not of serious consequence with most commercial message traffic. Also, since a great many large centers of population are located near enough in longitude to permit reasonably long periods of operation daily, the necessity for relaying would be minimized. A Paris to New York link, for instance, would average something like seven hours solid, which at even one hundred words per minute means handling four hundred twenty thousand words per channel. This transmission speed is a conversative estimate, and probably would be substantially bettered in practice.

Telephone communication? Probably not. Aside from the technical difficulty and economic impracticability involved in increasing the bandwidth sufficiently to accommodate even single sideband voice transmission, the time lag would entail a waste of five seconds after each remark from one end of a circuit before the reply arrived, and the psychological difficulty involved in adjusting to such a lapse would be prohibitive. Picture an irate wife in Chicago admonishing a husband in Paris to rush home under such conditions! Deaths from apoplexy alone would be a serious problem.

The practicability of the telegraphic channel seems certain because of the elimination of communication dropouts due to disturbances in the ionosphere. It remains then to consider some possible extensions of our new probe into other fields of endeavor than the carrying of Aunt Matilda's admonitions to Uncle Horace, who is still in Paris.

Construction of a unit specially designed for astronomical and general scientific work would be of the highest value, particularly if efforts were made to improve the apparatus to the limits of present technical advance. If the peak power were raised to 500 kilowatts in our scientific instrument, and the beam radiated by the antenna was reduced to an angle less than one degree, using the same receiver bandwidth, an increase in signal to noise ratio of several thousand could probably be reached for echoes from the moon. Even narrower beam angles are possible although antenna structures to produce such sharp beams at 100 megacycles would be extremely large and awkward to point. However, there is always the possibility of going to higher frequencies as the art progresses, and even at 100 megacycles equipment of this sort would be well worth while.

For one thing, studies of the absolute speed of light could be conducted, using the moon as target, and perhaps even some of the larger surface features of the moon could be more definitely measured. Turning from the moon for the moment, there is a bare possibility that Venus or Mars could be reached at a favorable conjunction, in spite of the small angular diameter and distance of these bodies. Although considerable data suggesting unfavorable surface conditions on these planets has been derived by spectroscopic analysis, many

people still believe they may be inhabited by intelligent life forms. It is certainly too early to say this cannot be true, and a radio measuring rod extended to these bodies might furnish additional data for such speculation.

Many years ago when radio was in its diaper stage, an attempt was made to pick up any signals which might be arriving from outside the atmosphere, but no results were obtained, although many reports of unexplained signals had been received from casual listeners. Unfortunately for such early experimenters, only the longer radio wave lengths were employed, and we now know that such waves do not penetrate the ionosphere except at very rare intervals. This leaves the question of communications from other planets an open one at present.

If it is possible to obtain a usable echo from the nearer planets, a very vexing scientific problem may be solved, given a little luck. Astronomers would like very much to know whether or not the planet Venus rotates on its axis or presents the same face eternally to the sun, and if the hidden surface of that planet has such large topographical features as our own, it might be possible to detect rotation by a regularly recurring dip or rise in the echo. The spectroscope revealed no rotation when used to examine light from the planet's cloudy envelope, but the evidence is not conclusively against a rotational period of several days, and certain other factors point to this. Rotation, of course, has a profound effect on the chances for intelligent life on the planet.

The speeds of bodies within detection distance could be determined with good accuracy, and their distances also, because of the inherent accuracy of radar distance measurements, due to measuring an interval of elapsed time instead of a small angle.

And just incidentally, such a potent measuring rod might solve for radio engineers the puzzling mystery of the long, *long* delayed echoes. Scientists don't talk about this one much, for nobody's got a good, vacuum-packed, triple distilled, 99-44/100 percent pure explanation ready, but the stubborn, well-authenticated facts are known. Ionosphere heights are measured by a pulse-and-echo system similar to radar, and while the usual measurement is fairly routine stuff, there have been a number of cases where well identified echoes returned several *minutes* after transmission of the pulse. No, nobody knows from where.

We now approach the thin, quivering end of our limb of speculation, where the growth of "ifs" becomes so dense as to almost obscure the gulfs yawning for the feet of the unwary writer. *When* rocket-driven vehicles are sent outside the earth's atmosphere, techniques and apparatus similar to that used in the moon experiment will serve for communication, navigation, meteor warning, velocity indicating, and control of pilotless exploration craft. This seems a foregone conclusion,

but there occurs another interesting possibility. Once the spaceship is a going proposition—pun intended—it becomes possible to establish a permanent observatory outside the earth's atmosphere, either on the moon, or in a special man-made satellite which could be established in an orbit near the earth. There being no atmosphere either on the moon or our observatory in its chosen orbit, astronomical seeing becomes well-nigh perfect, and *there is no atmospheric electrical noise* to interfere with our probings. If this combination doesn't provide solutions to a flock of perplexing problems now hopelessly hampered by the necessity for working through our interfering air blanket, then we had better return to huddling in caves and investigating our world by tinkering with the innards of sacrificial goats.

THE END.

Brass Tacks

(*Continued from page 98*)

porary of the Third Foundation Empire.

Should this general trend in sf stories indicate that authors are despairing of getting ethics developed or did this subject simply escape their attention? As for myself, I simply cannot believe that a man whose horizon has been widened far beyond the reach of his own solar system should continue to apply the same yardstick we use to apply as regards moral, ethics, religion and so forth.

Now let me deal with quite another question. Please accompany one of the next numbers with a questionary, a kind of Gallup Poll to know what the majority of your readers like. I daresay that after some attempts to the good, viz. "Mimsy Were the Borogoves," "The Barrier" and such like, you simply have slipped back to wild western stories adapted to new surroundings. The only difference is that the hero is not mounting a steed but a space rocket and instead of firing a Colt he is spraying death and sickness by an atomizer. Now please, some of us are beyond the age of that.

To get back to the last issue—November 1945—what earthly motives had you to print "By Yon Bonny Banks"? And, as I already said before, also the "Mule" is taking a definite wild west turn. Could you not have your authors find something more original or are you lacking material? In the latter case, I rather would prefer to have ASF a bimonthly or quarterly.

Do not take it amiss, I wanted to get some steam off. Already for a couple of years I wanted to write you, but came the war, came the general restrictions, et cetera. But by now some of your authors should be back from killing Japs and straightening crooked Nazis' minds.—Arthur G. Loeffler, Casilla Correo 2700, Buenos Aires, Argentine Republic.

The Chronokinesis Of Jonathan Hull

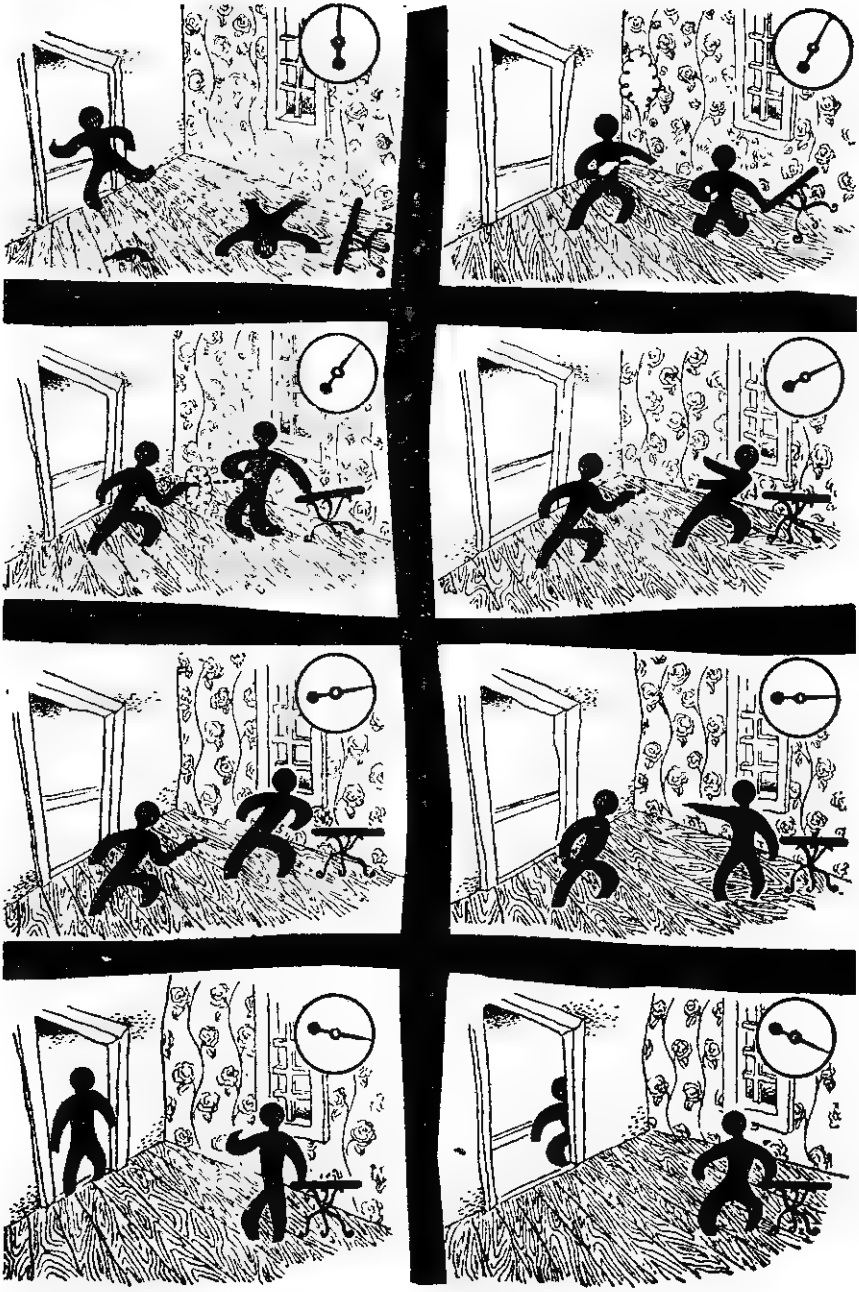
by ANTHONY BOUCHER

***Time** travel might make murder easy—but time travel itself, even though accomplished, might not be an easy thing to bear—*

Illustrated by Swenson

This isn't, properly speaking, Fergus O'Breen's story, though it starts with him. Fergus is a private detective, but he didn't function as a detective in the Jonathan Hull episode. It was no fault of his Irish ingenuity that he provided the answer to the mystery; he simply found it, all neatly typed out for him. Typed, in fact, before there ever was any mystery.

In a way, though, it's a typical O'Breen anecdote. "I'm a private eye," Fergus used to say, "and what happens to me shouldn't happen to a Seeing Eye. I'm a catalyst for the unbelievable." As in the case of Mr. Harrison Partridge, who found that the only practical use for a short-range time machine was to provide the perfect alibi for murder. But the Partridge case was



simplicity itself compared to the Hull business.

It began—at least according to one means of reckoning a time sequence—on the morning after Fergus had trapped the murderer in the Dubrovsky case—a relatively simple affair involving only such prosaic matters as an unbreakable alibi and a hermetically sealed room.

None the less it was a triumph that deserved, and received, wholehearted celebration, and it was three o'clock before Fergus wound up in bed. It was eight when he unwound upon hearing a thud in the corner of the room. He sat up and stared into the gloom and saw a tall thin figure rising from the floor. The figure moved over to his typewriter and switched on the light. He saw a man of about sixty, cleanshaven, but with long, untrimmed gray hair. An odd face—not unkindly, but slightly inhuman, as though he had gone through some experience so unspeakable as to set him a little apart from the rest of his race.

Fergus watched curiously as the old man took an envelope out of a drawer in the desk, opened it, unfolded the papers it contained, set them in a pile beside the typewriter, took the topmost sheet, inserted it in the machine, and began typing furiously.

It seemed a curious procedure, but Fergus' mind was none too clear and the outlines of the room and of the typist still tended to waver. *Oh well,* Fergus thought, *long-haired old men at typewriters is pretty mild in view of those boiler makers.* And he rolled over and back to sleep.

It was about an hour later that he opened his eyes again, much surprised to find Curly Locks still there. He was typing with his right hand, while his left rested on a pile of paper beside him. As Fergus watched, the old man pulled a sheet from the typewriter and added it to the pile at his left. Then he put the pile in the side section of the desk which housed unused paper, rose from the machine, switched off the light, and walked out the door; with a curious awkward walk, as though he had been paralyzed for years and had had to learn the technique all over again.

The dominant O'Breen trait, the one that has solved more cases than any amount of ingenuity and persistence, is curiosity. A phantasm that stays right there while you sleep is worth investigating. So Fergus was instantly out of bed, without even bothering to pull on a robe, and examining the unused paper compartment.

He sighed with disgust. All the sheets were virginally white. It must have been a delusion after all, though of a singular sort. He turned back to bed. But as he did so, his eye glanced at the corner where he had heard that first thud. He executed a fabulous double take and looked again. There was no doubt about it.

In that corner lay the body of a tall thin man of about sixty, cleanshaven, but with long untrimmed gray hair.

The average man might find some difficulty in explaining to the police how an unidentified corpse happened to turn up in his bedroom. But Detective lieutenant A. Jackson had reached the point where he was surprised at nothing that involved O'Breen.

He heard the story through and then said judiciously, "I think we'll leave your typewriter out of the report, Fergus. If your Irish blood wants to go fey on you, it's O. K. with me; but I think the Psychical Research Society would be more interested in a report on it than the L. A. Police Department. He died when you heard that thud, so his actions thereafter are pretty irrelevant."

"Cyanide?" Fergus asked.

"Smell it from here, can't you? And the vial still clenched in his hand, so there's no doubt of a verdict of suicide. To try a little reconstruction: Say he came to see you professionally about whatever was preying on him. Found you asleep and decided to wait, but finally got restless and finished the job without seeing you."

"I guess so," said Fergus, taking another gulp of tomato juice. "This and the coffee make the typewriter episode seem pretty unlikely. But no O'Breen's gone in for second sight since great-great-grandfather Seamus. I'll expect the family leprechaun next."

"Tell him these shoes need resoling," said Lieutenant Jackson.

For twenty-four hours the affair rested at that. Suicide of Unknown. Nothing to identify him, not even laundry marks. Checkup on fingerprints fruitless. One odd thing that bothered Jackson a little: the man's trousers had no cuffs.

Sergeant Marcus, whose uncle was in cloaks and suits, had an idea on that. "If we get into this war and run into a shortage of material, we'll all be wearing 'em like that. Maybe he's setting next year's styles."

When Fergus heard this, he laughed. And then he stopped laughing and sat down and began thinking. He thought through half a pack of Camels in a chain before he gave up. There was a hint there. Something that was teasing him. Something that reminded him of the Partridge case and yet not quite.

The notion was still nibbling at the back of his mind when Jackson called him the next day. "Something might interest you, Fergus. Either a pretty farfetched coincidence or part of a pattern."

"My pattern?"

"Your pattern maybe. Another old man with long hair and no identification. Found in a rooming house out on Adams in a room that was supposed to be vacant. But this one was shot."

Fergus frowned. "Could be. But is long hair enough to make it a coincidence?"

"Not by itself. But he hasn't any cuffs on his pants either."

Fergus lost no time in getting to the West Adams address. One time mansion fallen on evil days, reduced to transient cubicles. The

landlady was still incoherently horrified.

"I went into the room to fix it up like I always do between tenants and there on the bed—"

Jackson shooed her out. The photographing and fingerprinting squads had come and gone, but the basket hadn't arrived yet. He and Fergus stood alone and looked at the man. He was even older than the other—somewhere in his late seventies, at a guess. A hard, cruel face, with a dark hole centered in its forehead.

"Shot at close range," Jackson was commenting. "Powder burns. Gun left here—clear prints on it." There was a knock on the door. "That'll be the basket."

Fergus looked at the trousers. The cuffs hadn't been taken off. They were clearly tailored without cuffs. Two old men with cuffless trousers—

Jackson had gone to open the door. Now he started back with a gasp. Fergus turned. Gasps aren't easily extorted from a police lieutenant, but this one was justified. Coming in the door was the exact twin of Fergus' typing corpse, and walking with that same carefully learned awkwardness.

He seemed not to notice the corpse on the bed, but he turned to Jackson when the officer demanded, "And who are you?" To be exact, he seemed to turn a moment before Jackson spoke.

He said something. Or at least he made vocal noises. It was a gibberish not remotely approximating any language that either detective had ever heard. And there followed a minute of complete cross-purposes, a cross-examination in which neither party understood a syllable of the other's speech.

Then Fergus had an idea. He took out his notebook and pencil and handed them over. The old man wrote rapidly and most peculiarly. He began in the lower right hand corner of the page and wrote straight on to the upper left. But the message, when he handed it back, was in normal order.

Fergus whistled. "With that act on a blackboard, you could pack 'em in." Then he read the message:

I see that I will have succeeded, and because of the idea that has just come to my mind I imagine that you already understand this hell as much as it is possible for one to understand who has not gone through it and know that it is impossible to arrest me. But if it will simplify your files, you may consider this a confession.

Jonathan Hull

Jackson drew his automatic and moved toward the door. Fergus took out one of his cards with business and home address and penciled on it:

Look me up if you need help straightening this out.

An idea seemed to strike the man as he accepted the card. Then his features widened in a sort of astonished gratification and he looked at the bed. Then with that same rapid awkwardness he was walking out of the room.

Detective lieutenant Jackson called a warning to him. He tried to grab him. But the man went

right on past him. It isn't easy to fire a close-range bullet into a gray-haired old man. He was out of the room and on the stairs before Jackson's finger could move, and then the bullet went wild.

Jackson was starting out of the room when he felt Fergus' restraining hand on his arm. He tried to shake it off, but it was firm. "You'll never catch him, Andy," said Fergus gently. "Never in God's green eternity. Because you see you can't have caught him or he couldn't have typed—"

Jackson exploded. "Fergus! You don't think this trick-writing expert is another wraith for your second sight, do you? I saw him, too. He's real. And he must be your corpse's twin. If we find him, we can have the answer to both deaths. We can—"

"Telephone for you, lieutenant," the landlady called.

When Jackson returned, his chagrin over Jonathan Hull's escape was forgotten. "All right," he said wearily. "Have it your way, Fergus. Ghosts we have yet. Do I care?"

"What happened?"

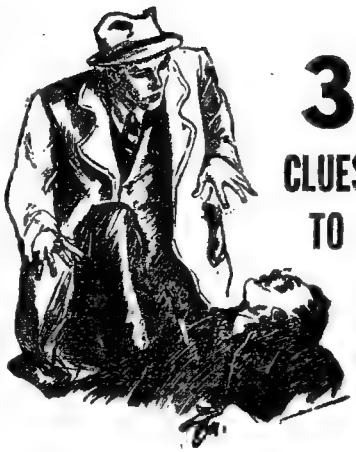
"Anything can happen. Everything probably will. There's no more sense and order in the world. Nothing a man can trust."

"But what is it?"

"Fingerprints. They don't mean a thing any more."

"The prints on the gun?" Fergus said eagerly. "They belong to my corpse?"

Jackson nodded shamefacedly.



3 CLUES TO MURDER

Jerry Reeth was looking for his rightful share in the old mine—but what he got was a body in his room. And that was only the start of trouble!

A strange Spanish playing card, a baggage check and a bank check are the clues in a medley of terror and death, and only The Shadow can piece together the intricate pattern along ALIBI TRAIL. Be sure to read this exciting tale of another Shadow triumph in the June issue of

THE SHADOW

AT ALL NEWSSTANDS

"So a cuffless ghost came back and— But it's worse than that. Much worse. This stiff's prints—they belong to a seventeen-year-old kid working out at Lockheed." With these words the lanky lieutenant seemed to reach the depth of despair.

But they brought new hope to Fergus' face and a triumphant glint to his green eyes. "Perfect, Andy! I couldn't have asked for better. That rounds it off."

Jackson looked up wide-eyed. "You mean it makes sense? O. K., maestro; what's the answer?"

"I don't know," said Fergus coolly. "But I know *where* the answer is: in the drawer of my desk."

He stubbornly refused to say a word until they were in his room. Then he said, "Look at all the little things we saw: How Hull turned to you just *before* you spoke to him; how he registered amazement, and *then* looked at the corpse; above all, how he wrote that note. And the wording of the note too: 'I *will have* succeeded,' and how we must *already* understand because of something he just thought of. There's only one answer to it all: *"Jonathan Hull is living backwards."*

Jackson burst out with a loud, "Nonsense!"

"It even explains the absence of the cuffs. They're trousers from next year, when we'll be in the war and Sergeant Marcus' prophecy will come true."

"Then you mean that the other stiff too—?"

"Both of 'em."

"O.K. Grant you that much, and I suppose in some cockeyed way it explains the prints of a corpse on a murder weapon. But that kid out at Lockheed—"

"—*is* your second stiff. But don't trust me: Let's see what Hull himself has to say." Fergus reached for the drawer.

"Hull left a message before he bumped himself off?"

"Don't you see? If he's living backwards, he came into my room, sat at the typewriter, wrote a message, and then killed himself. I just saw it being reeled off hindsideto. So when I 'saw' him taking an envelope out of this drawer, he was actually, in his own time-sequence, *putting it in.*"

"I'll believe you," said Jackson, "when I see—"

Fergus had pulled the drawer open. There lay a fat envelope, inscribed:

FOR FERGUS O'BREEN FROM JONATHAN HULL.

"All right," said the lieutenant, "so your conclusion is correct. That still doesn't mean your reasoning is. How can a man live backwards? You might as well ask the universe to run in reverse entropy."

"Maybe it does," said Fergus. "Maybe Hull just found out how to go forwards."

Jackson snorted. "Well, let's see what he says."

Fergus read: " 'The first indication of my strange destiny was that I could see ghosts, or so I then interpreted the phenomena.' "

Jackson groaned. "Ghosts we have again! Fergus, I will not have the supernatural. The parascientific is bad enough, but the supernatural—*no!*"

"Is there necessarily any difference?" Fergus asked. "What we haven't found the answer to, we call supernatural. Maybe Jonathan Hull found an answer or two. Subside, Andy, and let's settle down to this."

They settled.

THE NARRATIVE OF JONATHAN HULL

The first indication of my strange destiny was that I could see ghosts, or so I then interpreted the phenomena. The first such episode occurred when I was five years and came in from the yard to tell the family that I had been playing with Gramps. Since my grandfather had died the previous year in that mysterious postwar epidemic, the family was not a little concerned as to my veracity; but no amount of spanking shook me from my conviction.

Again in my twentieth year, I was visited in my lodgings near the Institute by my father, who had died when I was fifteen. The two visitations were curiously similar. Both apparitions spoke unintelligible gibberish and walked with awkwardly careful movements.

If not already, you will soon recognize these two traits, Mr. O'Breen. When I add that the Hulls are noted for the marked physical resemblance between generations, you will readily understand the nature of these apparent ghosts.

On neither of these occasions did I feel any of the conventional terror of revenants. In the first case, because I was too young to realize the implications of the visit; in the second, because I had by my twentieth year already reached the conclusion that my chief interest in life lay in the fringes of normal existence.

Too much of scientific work, by the time I reached the Institute, was being devoted to further minute exploration of the already known, and too little to any serious consideration to the unknown or half-known, the shadowy blurs on the edges of our field of vision. To pursue the work as mathematical physicist for which I was training myself meant, I feared, a blind alley of infinite refinement and elaboration.

To be sure, there was the sudden blossoming of atomic power which had begun after the war, when peacetime allowed the scientists of the world to pool their recent discoveries with no fear lest they be revealing a possible secret weapon. But the work that needed doing now in that field was that of the mechanic, the technician. Theory was becoming fixed and settled, and it was upon my skill in theoretical matters that I prided myself.

Yes, I was the bright young lad then. There were no limits to my aspirations. The world should glow with the name of Hull. And behold me now: a ghost even to myself, a murderer, and soon a suicide. Already, if my understanding of the reversal is correct, my body lies in that corner; but I cannot turn my eyes to it to verify my assumption. And I was always more satisfied with the theory than with the fact.

I was the prodigy of the Institute. I was the shining star. And Lucifer was a shining star, too.

When the United Nations established the World Institute for Paranormal Research at Basle, I recognized my niche. My record at the local institute and my phenomenal score in the aptitude test made my admission a matter of course. And once surrounded by the magnificent facilities of the WIPR, I began to bestow upon the name of Hull certain small immortalities.

Yes, there is that consolation. The name of Hull will never quite die while extra-sensory perception is still measured in terms of the H. Q., the Hull quotient, or while Hull's "Co-ordinating Concordance to the Data of Charles Fort" still serves as a standard reference work. Nor,

I suppose, while mystery-mongers probe the disappearance of Jonathan Hull and couple his name with those of Sir Benjamin Bathurst and the captain of the *Mary Celeste*—a fate that shall be averted, Mr. O'Breen, if you follow carefully the instructions which I shall give you later.

But more and more one aspect of the paranormal began to absorb me. I concentrated on it, devouring everything I could obtain in fact or fiction, until I was recognized as the WIPR's outstanding authority upon the possibilities of chronokinesis, or time travel.

It was a happy day when I hit upon that word *chronokinesis*. Its learned sound seemed to remove the concept from the vulgar realm of the time machines cheapened by fiction fantasists. But even with this semantic advantage, I still had many prejudices to battle, both among the populace and among my own colleagues. For even the very men who had established extra-sensory perception upon a scientific basis could still sneer at time travel.

I knew, of course, of earlier attempts. And now, I realize, Mr. O'Breen, why I was inclined to trust you the moment I saw your card. It was through a fortunately preserved letter of your sister's, which found its way into our archives, that we knew of the early fiasco of Harrison Partridge and your part therein. We knew, too, of the researches of Dr. Derringer, and how he gave up in despair after his time traveler failed to return, having encountered who knows what unimaginable future barrier.

We learned of no totally successful chronokinetic experiment. But from what we did know of the failures, I was able to piece together a little of what I felt must be the truth. Surely the method must involve the rotation of a temporomagnetic field against the "natural" time stream, and Hackendorf's current researches would make the establishment of such a field a simple matter.

It was then that I hit upon my concept of reversed individual entropy—setting, so to speak, the machinery of the individual running in an order opposite to the normal, so that movement along the "contrary" direction of the time stream would be for him natural and feasible.

This was what brought about the break. There were some among my colleagues who thought the notion ridiculous. There were others, those hyperserious scientists who take upon themselves the airs of hierophants, who found it even sacrilegious and evil. There were a few practical souls who simply feared it to be impossibly dangerous.

There was not one who would tolerate my experiments. And that is why, Lucifer-like, I severed my connection with the WIPR and retired to America, to pursue by myself the chronokinetic researches which would, I was sure, make Hull a name to rank with the greatest in all the history of science.

It was at this time that Tim Givens enters into the story. My own character I think you will have gathered sufficiently from these pages, but of Givens I must give a more explicit picture.

He was almost twenty years older than I, and I was then thirty. This was in 1971, which meant that he was just a boy fresh out of high school at the time of the war. His first experience of life was to find himself in an aircraft factory earning highly impressive sums. He had no sooner adjusted himself to a wonderful and extravagant life than he was drafted and shortly engaged in slaughtering Japanese in the Second Malayan Campaign.

He came back from the war pitiably maladjusted. It was difficult enough for most young men to return to civilian life: it was impossible for Tim Givens, because the only civilian life he had known, the lavish boom of war industry, was no more. We skillfully avoided a post-war depression, true, but we did not return to the days when untrained boys in their teens could earn more in a week than their fathers had hoped to see in a month.

Given felt that he had saved the world, and that the world in return owed him the best. He took part payment on that debt when and where he could. He was not a criminal; he was simply a man

who took short cuts whenever possible.

I cannot say that I liked him. But he was recommended to me through remote family connections; he had a shiftily alert mind; and he had picked up, in the course of his many brief jobs, a surprising mechanical dexterity and ingenuity. The deciding factor, of course, was that the skilled technicians I should have wished to employ were reluctant to work with a man who had left the WIPR under something of a cloud.

So I took Givens on as my handyman and assistant. Personal relationships had never formed a major element in my life. I thought that I could tolerate his narrow selfishness, his occasional banal humor, his basic crassness. I did not realize how lasting some personal relationships may be.

And I went on working on the theory of reversed entropy. My calculations will be found in my laboratory. It would be useless to give them here. They would be meaningless in 1941; so much depends upon the variable significance of the Tamirovich factor—discovered 1958—and the peculiar proportions of the alloy duralin—developed in the 1960's—and my own improvement on it which I had intended to christen chronalin.

The large stationary machine—stationary both in space and in time—was to furnish the field which would make it possible for us to free ourselves from the "normal" flow of time. The small handsets were to enable us to accelerate and decelerate,and eventually, I trusted, to re-reverse our temporal motion.

This, I say, was the plan. As to what ultimately happened—

I am sure that Tim Given substituted a cheaper grade of duralin for the grade which had met my tests. He could have netted a sizable profit on the substitution, and it would have been typical of his petty opportunism. He never admitted as much, but I remain convinced.

And so what happened was this:

We entered the large machine. For a moment I had been worried. I thought I had seen two suspicious-looking figures backing into the room by the rear door, and I feared vandalism. But a checkup indicated nothing wrong and no sign of intruders; and I pressed the control.

I cannot describe that sensation to anyone who has not experienced it. A sudden wrenching that seems to take all your vitals, carefully turn them inside out in some fourth dimension, and replace them neatly in your shaken body. A horrible sensation? I suppose so; but at the moment it was beautiful to me. It meant that something had happened.

Even Tim Givens looked beautiful to me, too. He was my partner on the greatest enterprise of the century—of the centuries. I had insisted on his presence because I wanted a witness for my assertions later; and he had assented because, I think, he foresaw a mint of money to be earned in television lectures by The Man Who Traveled in Time.

I adjusted the handset to a high acceleration so that we might rapidly reach a point sufficiently past to be striking. (Givens' handset was telesynchronized with mine; I did not trust his own erratic impulses.) At the end of ten minutes I was frowning perplexedly. We were still in the stationary machine and we should by now have passed the point at which I constructed it.

Given did not notice my concern, but casually asked, "O. K. yet, M. S.?" He thought it humorous to call me "M. S.," which was, indeed, one of my degrees but which he insisted stood for Mad Scientist.

Whatever was wrong I would not find it out by staying there. Perhaps nothing whatsoever had happened. And yet that curious wrenching sensation surely indicated that the temporomagnetic field had had some effect.

I beckoned to Givens to follow me, and we stepped out of the machine. Two men were backing away from it in the distance. Their presence and their crablike retrograde motion worried me, and reminded me of those other two whom we had only glimpsed. To avoid them, we hastily slipped out the rear door, and into a world gone mad.

For a moment I had the absurd notion

that some inconceivable error had catapulted us into the far distant future. Surely nothing else could account for a world in which men walked rapidly backwards along sidewalks and conversed in an unheard of gibberish.

But the buildings were those of 1971. The sleek atomic motorcars, despite their fantastic reverse motion, were the familiar 1972 models. I realized the enormity of our plight just as Tim Givens ejaculated: "M. S., everything's going backwards."

"Not everything," I said succinctly, and added none too grammatically, "Just us."

I knew now who the two crab-backing men were that we had seen in the laboratory; ourselves. And I recognized, too, what conspicuous figures we must now be, walking backwards along the sidewalk. Already we were receiving curious stares, which seemed to us, of course, to come just before the starers noticed us.

"Stand still," I said. "We're attracting attention. We don't want to advertise our situation, whatever it is."

We stood there for an hour, while I alternately experimented with the handsets and wrestled with the problem of our existence. The former pursuit I soon found completely fruitless. Obviously the handsets exerted no effect whatsoever upon our status. The latter was more rewarding, for in that hour I had fixed several of the rules necessary to our reversed existence.

It had been early morning when we entered the stationary machine, and by now the sun was already setting in the east—a phenomenon to which I found perhaps more difficulty in adjusting myself than anything else that befell us. "As I recall," I said, "last night, which we are now reapproaching, was exceedingly cold. We need shelter. The laboratory was unoccupied last night. Come."

Followed, or rather preceded, by the stares of passersby we returned to the laboratory, and there for a moment found peace. The disturbingly arsy-versy normal world was shut off from us, and nothing reminded us of our perverse condition save the clock which persistently told off the minutes counterclockwise.

"We shall have to face the fact," I said, "that we are living backwards."

"I don't get it," Givens objected. "I thought we was going to go time-traveling."

"We are," I smiled ruefully, and yet not without a certain pride. "We are traveling backwards in time, something that no one in the history of our race has hitherto accomplished. But we are doing so at the rate, if I may put it somewhat paradoxically, of exactly one second per second; so that the apparent result is not noticeable travel, but simply reverse living."

"O. K.," he grunted. "Spread on the words any way you want. But this is what's bothering me the most: When are we going to eat?"

I confess that I myself was feeling a certain nervous hunger by now. "There's always food in this small icebox here," I said. I was exceedingly fond of scrambled eggs at midnight when working on a problem. "What would you say to beer and eggs?"

I took out a plastic beer-tainer, pressed down the self-opener, and handed it to Givens as it began to foam. I took another for myself. It felt good and reassuringly normal as it went down.

Then I set down the beer-tainer, found a frying pan, and put it on the small electric range. I fetched four eggs from the icebox and returned to the stove to find no frying pan. I reached out another—it looked like the same one—but handling frying pans while holding four eggs is difficult. Both eggs and pan escaped my grip and went rolling off to a corner of the lab. I hastened after them, cloth in hand to clean up the mess.

There was no mess. There was no frying pan either, and no eggs.

Dazed, I returned to my beer. And there was no beer.

I got another beer-tainer out of the icebox, and sipping from it I drew a most important conclusion. Physical objects which we wore or held were affected by our fields and remained with us. Anything which we set down went on its normal course—away from us forever.

This meant that cooking was impossible for us. So would be eating in a restaurant, for we and the waiter would be going in temporally opposite directions. I explained this to Givens while we ate cheese.

"It's just a sample," I said, "of the problems we have ahead of us. If it weren't for the bare chance of achieving a reversal sometime, I should be tempted to shuffle off this coil now."

It took him a moment to gather my meaning. Then he guffawed and said, "Uh uh, M. S. Not for little Timmy. Life's the one thing to hold on to—the one thing worth living. And even if it's a screwy wrongwayround life I'm holding on."

Authors of your time, Mr. O'Breen, have occasionally written of time in reverse; but have they ever realized the petty details that such a life involves? All contact with other humanity is impossible. I have, through thirty years of practice, developed a certain ability to understand reverse speech, but no one can understand me in return. And even by written messages, how can an exchange be carried on if you ask me a question at 12:00 o'clock and I answer it at 11:59?

Then there is the problem of food. Not only this question of cooking; but how is one to buy food? How, as one's own clothes wear out, is one to replace them? Imagine yourself speeding along on an empty train, while another train laden with all the necessities of life passes on the parallel track in the opposite direction.

The torture of Tantalus was nothing to this.

I owe my life, such as it is, to Tim Givens, for it was his snide ingenuity which solved this problem. "It's a cinch," he said, "we just steal it."

We had by now learned to walk backward, so that we could move along the streets without exciting too much comment. Visualize this, and you will see that a man walking backward from 12:00 to 11:55 looks like a man walking forward from 11:55 to 12:00.

Visualize it further: A man moving in this wise who enters a store empty-handed at 12:00 and leaves loaded with food at 11:50 looks like a normal man who comes in with a full shopping bag at 11:50 and leaves without it at 12:00—a peculiar procedure, but not one to raise a cry of "Stop thief!"

My conscience rebelled, but necessity is proverbially not cognizant of laws. So we could live. We could have whatever we wanted, so long as we kept it on our persons. There was a period when Givens ran amok with this power. He plundered the city. For a time he possessed an untold fortune in banknotes and gold and precious gems. But their weight tired him in the end; crime has no zest when it is neither punishable nor profitable.

Work was impossible. I tried to do the necessary research and experiment to reverse our courses, but nothing could be achieved when all inanimate objects departed on another time stream as soon as I ceased to hold them. I could read, and did read inordinately, plundering libraries as eagerly as food stores. Sometimes I thought I saw a glimmering of hope, but

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it was the false daylight at the mouth of an endless and self-extending tunnel.

I missed music, although after some twenty years I did succeed in cultivating a taste for the unthinkable progressions of music heard in reverse. Givens, I think, missed knavery; at last the world was giving him gratis the living which it owed him, and he was bored.

So we took to travel—which was accomplished, of course, by climbing backward onto a boat or train at its destination and traveling back with it to its origin. In strange foreign lands the strangeness of reversal is less marked. And a magnificent mountain, a glinting glacier is free from time.

The best part of travel was waterfalls—perhaps the one advantage of our perverse state. You cannot conceive the awesome stateliness of a river leaping hundreds of meters in the air. We even made a special trip to British Guiana to see Kukenaam; and beholding it, I felt almost reconciled to my life.

I was most tormented when I despairingly abandoned any scientific research and took to reading novels. Human relationships, which had seemed so unnecessary to my self-absorbed life, now loomed all-significant. I wanted companionship, friendship, perhaps even love, as I had never wanted fame and glory.

And what did I have? Givens.

The only man with whom I could communicate in all the universe.

We tried separation occasionally, but never without appointing a meeting place and time for which we were always both early. Loneliness is a terrible thing, as no one else of my race can fully know.

We were inseparable. We needed each other. And we hated each other.

I hated Givens for his banal humor, his cheap self-interest.

He hated me for my intellect, my pride.

And each laid on the other the blame for our present fate.

And so, a few days ago, I realized that Givens was planning to kill me. In a way, I think it was not so much from hatred of me as because he had missed for thirty years the petty conniving of his old life and now at last saw that a grand crime was possible for him.

He thought that he was hiding it from me. Of course he could not. I knew every bulge of the possessions that he wore, and easily recognized the revolver when he stole it and added it to his gear.

We were in Los Angeles because I had come to look at myself. I found an odd pleasure in doing that occasionally, as you will have realized from my "ghosts," a bitter sort of joy. So now I stood in the Queen of the Angels Hospital peering through glass at my red-faced yowling two-day old self. A nurse smiled at me with recognition, and I saw she thought I was Gramps. There, looking at my beginning life, I resolved to save my life, however tortured and reversed it was.

We were then living in the room you know on West Adams. For some time we had developed the technique of watching for people moving into a place. After that—before, from the normal viewpoint—the place is untenanted and safe for our abode for a while.

I returned to the room to find Tim Givens' body on the bed. Then I knew that death had the power to stop our wanderings, that the dead body resumed its normal movement in time. And I knew what else I must do.

The rest of that scene you know. How I took your card, gave your official-looking friend my confession, and backed out—when you thought me entering.

When I next visited the room, Givens was there alive. It was surprisingly simple. Underestimating me in practical matters, he was not on his guard. I secured the revolver with no trouble. Just before I pressed the trigger—for the bullet, freed from my field, moved for a moment in normal time—I saw the bullet strike.

I pressed hard, and gave him release.

Now I seek it for myself. Only death can end this Odyssey, this voyage of loneliness and pain compared to which *The Flying Dutchman* sailed on a luxury cruise. And when this manuscript is typed, I shall swallow the cyanide I stole yesterday.

This manuscript must reach the World Institute from Paranormal Research. They will find my notes in my laboratory. They must know that those who foretold danger were right, that my method must not be used again save with serious revision.

And yet this cannot reach them before the experiment; for they would stop me and I was not stopped. Seal it, then. Place it in the hands of some trustworthy institution. And inscribe on it:

To be delivered to the World Institute for Paranormal Research, Basle, Switzerland, F. E. D., February 3, 1971.

Perhaps the name of Hull may yet not be forgotten.

Fergus O'Breen swore comprehensively for a matter of minutes. "The egotist! The lowdown egocentric idiot! Think what he could have told us: How the war came out, how the peace was settled, how atomic power was finally developed—! And what does he give us? Nothing that doesn't touch him."

"I wish that's all I had to worry about," said Detective lieutenant A. Jackson morosely.

"There are hints, of course. Obviously a United Nations victory or he wouldn't have been living in such a free world in 1971. And that F. E. D. in the address—"

"What would that mean?"

"Maybe Federated European Democracies—I hope. But at least we've learned a wonderful new word. Chronokinesis—" He savored it.

Jackson rose gloomily. "And I've got to get down to the office and try to write a report on this. I'll take this manuscript—"

"Uh uh. This was given me in trust, Andy. And somehow it's going to get to the WIRP on the appointed date."

"O. K. I'm just as glad. If the inspector saw *that* in the files—Want to come down with me and see what we can cook up?"

"Thanks no, Andy. I'm headed for the Queen of the Angels."

"The hospital? Why?"

"Because," Fergus grinned, "I want to see what a two-day old murderer looks like."

THE END.

The Chromium Helmet

by THEODORE STURGEON

This isn't the best of all possible worlds—but it was no help to five reasonably comfortable people to encounter the strange effects of the "cormium hemlet."

Illustrated by Swenson

"Daddy," said the Widget.

"Yes, dear," I said, without detaching my eyes or my mind from the magazine I was reading.

"When was the time I had a great big doll, bigger'n me, and she suddenly laughed at me and reached in her pocket and gave me a handful of jelly beans?"

"Yes, dear," I said.

"Well, when was it?"

"When was what?"

The Widget clucked her tongue in disapproval. "I said, when was it I had a doll bigger'n me, that could laugh and talk and give me jelly beans?"

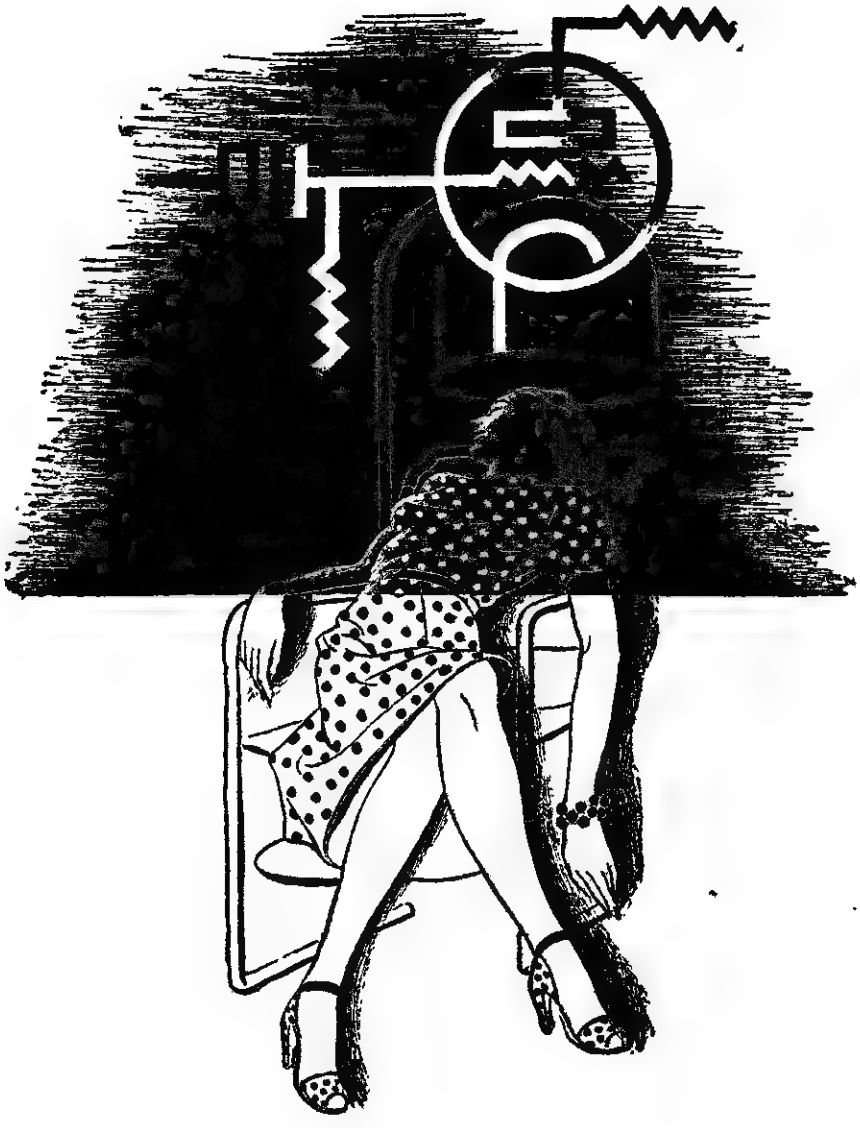
"Doll?" I said vaguely. "You never had a doll like that. You had one two years ago that said not only 'Mama' but 'Papa'."

"I stinkly remember about the jelly beans."

I sighed, feeling that this conversation was a little unproductive. "Why do you talk all the time?" I asked. It was a rhetorical question, but she cocked her head on one side and considered it carefully.

"I think it's 'cause I don't know any big words, like you and Mummy," she said, just in time to pull me up out of my magazine again, "so I have to use lots and lots of little ones."

I grinned at her, and she nodded to herself, acknowledging her success in getting between me and what I was reading. She removed the conquest from the abstract by running over and jumping up on my knee, sitting on the magazine. "Now tell me about the doll with the jelly beans."



"Widget, you never had a doll like that."

"Oh yes I did."

"Oh no—" I checked myself. That could go on for hours. "Tell me about it. Maybe I'll remember."

"She was a big doll. I put her to bed in Susie's crib." Susie was the Widget's Number One toy, a horrible pale-blue monolith of an earless rabbit. "The doll was so big her feet stuck out. I singed her to sleep and all of a sudden she threw up her hands and threw all the covers off, and she laughed at me and said I had a funny nose. I jumped up and started to ran away, but she called me. She said, 'Here's a pres-net for you.' And she reached into her pocket and gave me the presnet. It was jelly beans. She had on a red giggum pifanore."

"She had on a red gingham pinafore, and she gave you some jelly beans. What do you know. And I sup— oh!" In the time it took me to get that "oh" enunciated, I had seen my wife standing just inside the living-room door, with flour on her hands and on the tip of her nose, her bright head cocked to one side, listening; I had met her eye and caught her signal to go on talking to the Widget. I grinned; Carole was always poking and prying into what the Widget said, and coming up with startling conclusions culled from Freud and Jung and Watson. "And I suppose," I went on, "that the doll told you her name?"

"I didn't ask her."

"Darling, you always have names for your dolls," said Carole.

"Wh— Oh, hello, Mummy. No, this doll was differ-net. She wasn't *my* doll so much. It was like I was *her* doll."

Carole looked at me, puzzled. "Widget, you really remember about this?"

"Oh, yes."

"You're just pretending."

"No, Mummy, it isn't a pretend. I really and *truly* remember. Only I can't remember just when." She sounded very patient. "So that's why I asked Daddy."

I started to speak, but Carole checked me. "Was it a long time ago?"

"The doll?" The Widget's round little face wrinkled in concentration. "I don't know."

"Widget. Listen. You say you put her to bed in Susie's crib."

"Yes, in Susie's crib, an' she was so big her feet stuck out."

I suddenly realized the line Carole was taking. The Widget had gotten the crib for her birthday, nine months ago. "What were you wearing?" Carole asked.

The Widget closed her eyes. "It . . . was . . . mmm. Oh yes; it was my Aunt Marie dress, the one with the pink squirl."

"Marie sent that about four months ago, didn't she?" I asked. Carole nodded, and asked, "When did you first remember about the doll?"

"Oh, 'safternoon," said the Widget without hesitation. "When I was having my hair dried under the cormium hemlet."

"Translate that," I said.

"Chromium helmet," said Carole. "I took her to the beauty parlor and had her hair shampooed while I finished the shopping. She loved it. And she went fast asleep under the drier. I was interested in all this because, for once in her young life, she hasn't said ten consecutive words all afternoon until now."

"Oh, heck, she obviously dreamed the whole thing."

"Oh heck, I obverlously did not," said the Widget with composure. "Dreams is all fuzzy. But I stinkly *remember* about that doll."

"Drop it, Godfrey," Carole said swiftly as I came up out of my chair. I don't like to be flatly contradicted by anybody, even my infant daughter. "Widget, run on outside. Don't go away from the house. And don't contradict your father."

The Widget skipped across the room. "Yes Mummy. I'm sorry, Daddy." She opened the door, letting her body walk out while she kept her head inside. "But he contra-dicted me first," she said, and was gone.

"Parthian shot," I laughed. "Also, *touché*. Carole, why all the third degree?"

"Oh . . . I dunno, Godfrey. It isn't like her to make up tall tales."

"Nonsense! Every kid does it."

"Every kid doesn't, only most kids. The Widget never has."

"O.K. So she's started. It's perfectly normal. Darling," I said, going to her, "wipe off that troubled look! You women amaze me. You really do. Fond as I am of my own kid, I've never been able to understand how a woman can study a baby's face literally by the hour, and always seem to find something new and different in it. You've always done that, and now you're doing it with her mind. What's wrong in a child's being imaginative?"

She shook her head. "All right. Maybe I'm silly. But there's a difference between imagination and an actual remembrance of something which couldn't have happened."

"Don't be fooled because the Widget can't express herself any better than she does. I don't—"

Carole jumped up. "My cake!" and ran into the kitchen.

It began just as simply as that.

It was only a couple of days later that I got to the lab to find Henry straddling a chair, with the back holding his chin up, staring out of the window. I spoke to him twice before he heard me at all. Henry is a regular guy. Not only that, but he's married to my one and only sister.

"What's the matter, sadpan?" I asked.

"Nothin'."

I looked at him carefully. There's generally only one cause for such a beat-up expression. "Honeymoon over?" I asked.

"That's a lousy thing to say," Henry snapped. And it was. He and Marie had only been married four months or so. I shrugged.

"Don't let me horn in," I said. "Only— I've known youse guys for a long time."

He got up out of the chair and kicked it. "Godfrey, did Marie ever have anything to do with Wickersham?"

"Wickersham!" I said in astonishment. "Good gosh no! You know better than that!" Wickersham was the man we worked for. He wasn't famous for anything because he didn't want to be. He was remarkable in many ways. His firm manufactured psychological and psychiatric precision equipment —reflex timers, hypnotic mirrors, encephalographs, and the like. Wickersham kept himself to himself; we hardly ever saw him at all. Once every few days he would circulate around the shops and labs, his wide shoulders hunched, his black eyes everywhere. I always had the impression that his eyes were camera lenses, and that he would develop all he had seen later, spread the proofs out in front of him on his desk and study them. Few of us had been in his office—there was no need. If we wanted to see him we pressed a button—there was one in each lab, office and shop in the building. He had an annunciator, and he would show up eventually, in his own time. And Lord help the button-pusher if Wickersham didn't think the problem in hand required a consultation! But as far as Marie was concerned—as far as any woman was concerned—that was nonsense. The woman didn't live who could move an icicle like that. "Henry —don't be dopey. They never even met."

"Yes they did," said Henry glumly. "Don't you remember the union banquet?"

"Oh—that. Yeah, but he . . . I mean, he wasn't there for any high jinks. He wanted to see how many of his men were in the union, that's all. Not that he cares. He pays way above the union scale. But what's this about Marie?"

Henry shook his head. "Somebody's nuts. Me, maybe. Marie comes drifting in about an hour after I got home last night. She's walking on air. She is plenty affectionate always, but—" he ran his finger around his collar—*"whew!* Not like that. She was all over me. Says she guessed she never appreciated me before. Says it was so brave of me to . . . to punch hell out of Wickersham, and spoil that Rock of Gibraltar face of his." His voice went vague. "Took me about five minutes to get all that on a slow double-take. I finally asked her to start from the beginning. I got it piecemeal, but the pitch is that Wickersham was down on one knee pouring his heart out to her, reciting Keats—"

"Wickersham was?"

He nodded dismally. "And I came in, hauled him to his feet, spun him around with the old one-two, and pitched him out on his ear."

"And where did all this happen?"

He looked up at me dazedly. "In a private room at Altair House."

"Altair House? You mean that

gold-plated eatery on Sixty-fourth Street?"

"Yeh. And that's the craziest part of it all, because— I was never there in my life."

"Was she?"

"I asked her. She said sure she was—that one time; and didn't I remember?"

"She's kidding you, Henry."

"Nuts. You know your sister better than that. She kids around some, but not that way. No; she —well, she *says* she remembers about it. I asked her when it happened—before or after we were married. That stopped her. *She didn't know!* She chewed on that for a while and then apparently decided I was kidding *her*. She said, 'All right, darling, if you don't want to talk about it,' and dropped the subject. Godfrey, what's happening to her?"

"She never came out with anything like that before," I said. "Marie's a pretty cool-headed gal. Always was, anyway. Maybe she dreamed it."

Henry snorted. "Dreamed it? Godfrey, there's a heck of a difference between a good healthy dream and an actual remembrance of something which couldn't happen."

And where had I heard something like that recently?

That was the same day that I looked up from my bench and saw Wickersham. The late afternoon sun streaming through the laboratory windows high-lighted his huge, strange face, making velvet hollows of his eyes. There was a nervous ripple along his slab-sided jaw; otherwise he was as always, carven, unnaturally still. Henry's wild story that same morning returned to me with shocking clarity, as I pictured my little, good-natured puppy of a brother-in-law smashing a fist into that great dark unreadable face.

"Oh!" I said. "I didn't see you."

I was standing in front of my work, but he seemed to look down through me and examine it lying there on the bench. "That's the Hardin contract?" he said.

"Yes. The tone generators with the secondary amplifier for building up the supersonic beat."

He moved his hand slowly up, pulled his lower lip, slowly put his hand down again, and I remember thinking that that was the first time I had ever seen him make anything approaching a nervous gesture. Then, "Hardin can wait," he said. "I want to put you on another job."

I blinked. This wasn't Wickersham's style at all. He did good work for his customers—the best. But once a job was started, it was kept in production until it was finished, no matter who came along with a rush order. His reputation was such that he could tell anyone to go fly it if they didn't like it. "What's the job?" I asked.

He looked at me. He had black eyes, and they seemed to be all pupil. He seemed to be daring me to look surprised. "It's a burglar alarm," he said.

"But we don't manufac . . . I

mean," I said, "What kind of a burglar alarm?"

"An alarm with a psychological appeal," he said. "One that will not only announce that there is or has been an intruder, but will lead that intruder into being caught."

"You mean take his picture?"

"I mean, take *him.*"

"What sort of an installation? I mean, will it cover a room, or a house, or what?"

"A large room, about forty by thirty, with two outside walls. Four windows, one outside door, two inside. Run up any kind of cost you like, but get it done and get it done fast. Use any man or machine in the shop; you have absolute priority. I'll bring you a floor plan in an hour. I want your preliminary layouts by then. Can you stay here tonight?"

That last was like asking a jailed convict to stick around for a while. Wickersham had other ways besides his customary double time for overtime to persuade his staff to do what he wanted. Oh well, I could use the money. "I'll have to call my wife," I said.

Wickersham apparently took that for acquiescence, for he turned and stalked off without another word. I watched him go. He walked as if he were keeping time with slow music; as if he were holding himself back from breaking into a run.

Henry's jeweler's lathe whined to a stop and he came over.

"D' you hear that?" I asked.

"Most of it," he said. "What's eatin' him?"

"You noticed it too?" I shook my head. "He looks like a dope addict. Only I can't say just how. Henry, I've known him and worked close to him for nearly six years now, and I don't know the first thing about him. What makes him tick anyway?"

"Search me," said Henry. "I don't know how he does it. Old George, the night watchman, told me once that the Wick comes in before the sun is up, more often than not, and doesn't leave until after midnight. Sometimes he's here, day and night, for three days at a stretch. He doesn't seem to talk to anybody but us, ever, and that's only occasionally, about the work. A guy just interested in making money don't carry on like that."

"He's making money all right," I said. "He knows more about applied psychology than most of his clients, and they're all tops in the field. Most times he gets his orders by clapping together a new gadget for controlled hypnosis or something, and calling in the doctors who'd be most interested. He don't wait for their orders. They come when he calls them, and glad to." I began to clear a space on my bench. "Maybe he is cracking; I dunno. I wouldn't be surprised; only— Henry, I just don't see a guy like that cracking."

"Maybe he's human, after all," said Henry, unhappily, and I knew he was thinking of Marie's wild tale. "Let's get to this alarm thing. What'd he say about the building?"

So we got to work on it. At five I called Carole. She wasn't happy about it, but you'd have to know her as well as I do to guess it. I marry the nicest people.

The alarm we doped out was a nice set-up, and I pitied the burglar who would come up against it—though I couldn't know how much I would pity him later. The come-on that the Wick wanted was an iron window-grating kept ajar over an unlocked window. The window was free to slide up only six inches, where it was stopped by a chrome-plated and highly visible catch. The catch was so stiff that it would require both hands to release it. The burglar would have to squeeze up close to the wall, put both arms into the half-open window, and reach up with his arms bent to get to the catch. As soon as he swiveled the catch—*bang!*—the sash came down on his biceps. No bells would ring, nor lights; the alarm was turned in at a remote station and the police could come and get their pigeon at their leisure. The whole layout was put on the ready by a black-light installation; that is, the building was surrounded on its two accessible sides by a lawn and a high stone wall, without a gate. The wall was topped by the beams; another two crossed the gateless doorway in the wall in an invisible X. When anyone approached the building with honest intentions, as for instance, the cop on the beat on his way to try the door, he would be timed by relays. If he went in and stayed inside the wall longer than three minutes, the grating over the side window would unlock and swing ajar. If he tried the door and came right back, the side window would stay locked, and would not tempt investigation. And if anyone climbed over the wall when it was so easy to walk in, then, of course, the trick grating would do its stuff immediately.

Wickersham came in to watch Henry and me about nine o'clock that night, and I handed him the sketch of the installation I had superimposed on his plan of the building. He glanced at it and tossed it on the bench, saying nothing, which was his way of dealing out a compliment. He stayed about half an hour, and we didn't hear a sound out of him except when Henry stopped working, wiped the sweat out of his eyes, and lit a cigarette. Then Wickersham heaved a sigh, a sigh which was ten times worse than if he had barked at Henry to get back to work. Henry hunched his shoulders and did.

At about half-past one in the morning I finished the window catch and got it mounted on a conventional flush fitting. I went over to Henry's bench; he was adjusting the focus on the last of the little UV projectors.

"That about all?"

"Yep," he said. "Buzz the Wick." He yawned. "And me for bed."

I pushed Wickersham's call-button, and we heard his office

door crash open. "Jee-hosaphat!" said Henry. "He must've been in a racing crouch!"

"Finished?" said Wickersham as he came in. He might have added, "Good!" but it wouldn't occur to him. "Give me a hand with the parts, down to my car."

Henry said, "You want us to help with the installation?"

The Wick shook his head impatiently. "That's taken care of."

We gathered up everything the plans called for and a bunch of spare cable and fittings besides, and carried them down. As soon as the stuff was loaded, Wickersham swung in behind the wheel and roared off like a P-38.

"Funny business," I said, watching the car pull into a screaming turn at the first corner.

"Everything he does is funny business," said Henry, and yawned again. "Take me home and put me to bed."

I dropped Henry off and went home. The bedroom light went on as I wheeled into the drive, and the kitchen light was on as I locked the garage doors. There was never a time, early or late, when Carole wasn't up to see that I had something to nosch on when I came home. Which is the way a guy gets spoiled.

"Hi, Muscles," I said, slinging my hat at her. She caught it deftly, only to throw it over her shoulder and come and kiss me. "How's the Widget?"

"Talkative," said Carole, heading for the stove, where water was already heating the coffee. "Still going on about the talking doll in the giggum pinafore."

"Carole!" I went to her, put my face in the back of her shining hair. "You're *worried* about it!" I sniffed. "Mm. You smell good."

"Wave set," she said. "Don't muss me, darling. Yes, I am a little worried." She was quiet a moment, her hands deftly cutting and spreading bread, her mind far from them. "Marie came today."

"Oh?"

"Henry tell you anything?"

"Yes. He—"

Carole began to cry.

"Darling! Carole, what's the . . . stop it, and tell me what's wrong!"

She didn't stop it. Carole doesn't cry very well. I don't think she really knows how. "I've been too happy, I guess, Godfrey. I feel . . . I don't know, darling. Ashamed. I gloated at Marie."

"Too happy? A heck of a thing to cry about." I squeezed her. "Don't cry all over the liverwurst, honey."

"It isn't being too happy. I . . . I don't really know what it is." She put down the knife, turned in my arms, and hid her face in my coat. "I'm frightened. Godfrey, I'm *frightened!*"

"But what are you afraid of?"

"I don't know," she whispered. She trembled suddenly, violently, and then was still. "I'm afraid of something, and I don't know what the something is. That's part

of it. And part of is that I'm frightened *because* I don't know what it is. There's a difference, do you see?"

"Sure I see." Suddenly I felt about her the way I do about the Widget. She seemed so tiny; there was so much she couldn't understand yet, somehow. I talked to her as if she were a child. I said, "What kind of a something is it, darling? Is it a something that can hurt you?"

She nodded.

"How can it hurt you?" She was still so long that I thought she hadn't heard. "How can it hurt, darling? Can it jump out at you and knock you down? Is it that kind of a something?"

She shook her head promptly.

"Can it hurt—us?"

She nodded. I said, "How, Carole? How can it do anything to us? Can it take something away from us?"

"It did take something away."

"What?"

"I don't know. I don't know. I don't know. I don't know," she mumbled.

I held her and stroked her shoulder, and I felt lost. After a while I went and sat at the table and she finished making sandwiches for me.

It didn't stop there. In three days I was in the shape Henry had been in when Marie first came out with that fantasy of hers—and in those three days Henry was worse. Working, we did little more than to interrupt each other with accounts of the strange goings-on of our wives, and it wasn't fun.

"She won't forget it," said Henry, staring blindly at his bench. His production was away off—the little guy was a worker, but this thing had got between him and his work. "If I'd only known how serious it would be to her, I'd have grinned and said 'yes, yes, go on.' But I couldn't then, and it's no use trying now. I've done my best to persuade her the thing between her and the Wick never happened, but it's no use. The more I persuade, the more upset she gets. If she believes me, she begins to doubt her own sanity. If she doesn't believe me, she can't figure out what motive I might have for lying about slugging the man." He spread his hands, his eyebrows coming up sorrowfully. He looked more than ever like a litle lost puppy. "Dead end. What can you do?"

"You're lucky. At least Marie can put a name to what's worrying her. Carole can't. She's afraid, because she doesn't know what she's afraid of. She feels she's lost something, something important, and she is frightened because she doesn't know what it is. Where Marie's worried and—shall I say jealous, maybe?—and generally upset. Carole's scared silly. I've seen Marie worried before, about one thing or another. I've never seen Carole scared."

Henry gave up his pretense of working and came around to my bench. "Carole is the coolest head

I think I've ever run across," he said thoughtfully. "Maybe I am lucky. I . . . don't feel lucky, though— Godfrey, let's quit griping about effects and try to figure out causes. Do the two of them have the same trouble, or is it a coincidence?"

"Coincidence? Of course, Henry. The symptoms, if you want to call them that, are totally different."

"Oh, are they?"

"Well, what have they in common?" I said.

"Yeah," said Henry doubtfully. "Um— Nothing, I guess. Except—they've both lost something, and it worries them."

"Lost something? Carole has, but what has Marie—oh. Oh, I think I see what you mean. Marie has a memory of an event which is itself lost, as far as placing it in her life is concerned. Like the Widget's doll with the giggum pinafore."

"Like what?"

I told him about it. "I have a feeling that's what sent Carole off the deep end, when you come to think about it," I said. "She was worried about . . . hey! The Widget's trouble is the same as Marie's, when you break it down. She had a vivid memory of something that never happened, too. And she frets because she thinks she's lost it." I stared at him.

"For that matter, you and I both have the same trouble," said Henry suddenly. "We've certainly lost something."

I knew what he meant—particularly for himself. There is a certain something about being newly married that shouldn't be spoiled. His was being spoiled suddenly, which was so much worse. "No, Henry, I don't know why, but I think that's a side issue. Marie, the Widget, Carole. They have something. It's because they have something that we're in the state we're in." I suddenly noticed the remarkable fact that Henry wasn't even pretending to work. "Henry—we've got a deadline to meet on this job. Wickersham—"

Henry uttered one brief syllable that adequately disposed of Wickersham and the deadline. "All right—who had it first?"

"Why . . . Ma . . . no. Not Marie. The Widget and her doll. Then Marie and her melodrama. Then Carole and her . . . then Carole."

"The Widget, huh?"

"What are you driving at?" I snapped, seeing the vitreous sheen of stubbornness slip over Henry's eyes.

"Marie's always going over to your place, isn't she?"

"Henry, you're crazy! Contagion, for a . . . a mental disorder?"

"She had it first, didn't she?"

"She's just a kid!"

Henry looked at me levelly. "Just a kid. Would you say that if the three of them came down with scarlet fever and she was the first to have it, and the three of them had been together so much?"

"Now look," I said, trying to keep my voice down. "I hope I'm

wrong about what you're driving at. But there's nothing wrong with my kid, see?"

"You fellows lose something?" said Wickersham.

We literally jumped, used as we were to the Wick's cat-footing techniques. Henry stared at the big man, and his feet carried him back to his bench by pure reflex.

Wickersham stood there, teetering a bit on the balls of his feet, his big hands behind him. Suddenly his great still face broke, and his white, even teeth showed in a grin. Then he turned and walked out.

"To him," muttered Henry, "something is funny."

I said, "Sometimes I'm sorry he pays the kind of money he does."

We worked, then. If the Wick had tried, he couldn't have picked a sweeter moment to interrupt us. I was just on the point of achieving a thorough-going burn at Henry, with his goofy insinuations about the kid. Henry's glum and steady concentration at his bench kept me just under the blow-off point until it really began to hurt. Not another word passed between us, although I did drive him home as usual. But his words stuck.

"Widget," I said after dinner, "you're being very silly about this doll."

"Hm-m-m?" she said innocently.

"You know what I mean. Mummy says you've been talking her ears off about it."

"I want my doll again, that's all. Mrs. Wilton told Mummy that whenever she wanted anything from her old man she just talked and talked about it until he gave it to her to shut her up."

"Widget! You shouldn't listen to that kind of thing!"

"Listen? Did you ever hear Mrs. Wilton talk, daddy?"

I laughed in spite of myself. Mrs. Wilton whispered at about a hundred and thirty-five decibels. "Widget, don't change the subject. If I could get you a doll like that, I would. Don't you know that?"

"You did, though. I had the doll."

"Darling, you didn't have the doll. Truly you didn't. I would certainly remember about it, but I *don't*."

She opened her mouth to speak, and I braced myself for the blast of denial. I knew the symptoms. But instead her eyes filled with tears, and she ran out of the room to the kitchen, where Carole was doing the dishes.

I sat there feeling frustrated, feeling angry at myself and at the child. I tried to piece together the murmur of voices from the kitchen —the Widget's high and broken, Carole's soft and comforting—but I couldn't. The temptation to march in there and defend myself was powerful, but I knew that Carole was more than competent to handle the situation.

After what seemed like months, Carole appeared at the living-room door. "Stay out there and eat it all up, darling. There'll be more if you want it," she called back, her voice infinitely tender. Then

she swung on me with sparks flashing out of her eyes.

"Godfrey, how can you be so *stupid?*" she said scathingly.

"What's the matter?"

"Oh, you idiot," she said, sinking tiredly into a chair. "It wasn't bad enough to have the child in the grip of a dangerous fantasy; you had to make it worse."

"I don't see that its particularly dangerous, and I don't see how I made it worse," I said warmly. "Otherwise you may be right."

"Don't be sardonic," she said. "It doesn't suit your silly face. Oh darling, can't you see what's happened?" She leaned forward and spoke to me gently. "The Widget hasn't been unhappy about this thing. She's been bothered, and she's bothered me, but that's nothing I can't take."

"And what did I do?"

"You presented her with a new aspect to her problem. At first the doll was the important thing, but it wasn't overly important. But you have loaded her up with an insoluble abstract."

"What, sweetheart, are you driving at?"

"What, sweetheart," she mimicked, "do you think the child was crying about just now?"

"Search me. Disappointed about the final realization that her doll was a figment, I suppose."

"Nothing of the kind. She was crying because she had lost something more important than the doll. You see, beloved, strangely enough she trusts you. She believes you. She believes you now; but then if what you so solemnly told her is the truth, she is wrong about the doll."

"That was what I was after."

"But she *knows* she is right about the doll!"

"The doll idea is nonsense!"

"That doesn't matter. It's real enough to her. As far as she is concerned, the doll conception is the evidence of her senses. That's a tangible thing. The only evidence she has against it is your word. That's an abstract. She wants to believe it, but to do so she would have to deny a concrete realization. It isn't in human nature—normal human nature, that is—to choose, through faith, a fact when its alternative is supported by direct evidence."

"Oh . . . oh. I begin to see what you mean. So she's lost—"

"Both. Both her doll and the completeness of her belief in you." Her lower lip suddenly seemed a little fuller. "The way Marie and . . . and—"

I looked at her and thought of cat-footed Wickersham and his amused "Lost something?" and about then was when the thing began to get me mad.

All morning there was a coolness between Henry and me. I kept my nose pointed at my bench, and so did he. His suggestion that my Widget had in some way infected Carole and then Marie still griped me, and obviously his resentment of Marie's condition was aimed at the

Widget through me. It wasn't cozy.

He broke the ice. At a little after noon he came over and nudged my elbow. "Let's go eat."

"I've got my lunch here. You know that."

He hesitated, then went back to his locker. I suddenly felt like a heel. "Wait up, Henry." We usually ate in the shop, but when we wanted some beer with it we dropped around to O'Duff's, around the corner. I shut off my soldering iron and oscilloscope and joined him at the door.

After we were settled in the grill, munching sandwiches, Henry came out with it. "Look," he said, "I'm willing to drop what I said —*if* you can suggest an alternative. You ought to be able to. The whole thing's so crazy anyhow. It might be anything."

I grinned at him. "Heck, Henry, I know why you picked on that contagion angle. It was the only common denominator. Now, instead of jumping to conclusions, suppose we figure out a solider one."

"Suits me," he said, and then, "Godfrey, I hate to stay mad at anyone!"

"I know, I know," I smiled. "You're a good apple, Henry, in spite of your looks. Now let's get to it. When did our women-folks get this affliction, and how? What was it—time of day, environment, or what?"

"Hm-m-m. I dunno. Seems as if they got it outside somewhere. Marie walked into my house with it. I think you said the kid had it when you got home that evening?"

"Yeah, and Carole had been out. Hm-m-m. Widget in the afternoon, Carole in the evening—what about Marie?"

"She was late home that first night, the night she climbed all over me congratulating me for the Humphrey Bogart act."

"Where had she been?"

"Uh? I dunno. Shopping or something, I guess."

"Call her up and ask her."

"O. K.—wait. No, Godfrey. I don't want to remind her of it."

"I see your point. Uh—maybe we don't have to." I thought, hard. One of the Widget's odd little mispronunciations was running around in my head. "Gig-gum pinafore," I said vaguely.

"What?" snapped Henry, startled.

I grinned. "Hold on— Uh . . . oh. Got it! I got it, Henry! The cormium hemlet!"

"And I've got athlete's foot. What are you gibbering about?"

I grabbed his arm excitedly and spilled his beer. "Carole took the kid into the beauty shop for a shampoo. The Widget told me herself that she first remembered her talking doll under the cormium hemlet—chromium helmet. She fell fast asleep under the hair drier. And . . . that's it, Henry! . . . That night Carole first acted up, I started to mug around—I said she smelled good. She drew back a little and said, 'Wave set.

Don't muss me.' Now, when Marie came in late that night, hallucination and all, could she have just come from—"

"The beauty shop!" said Henry. "Of course!" He pondered, while the beer ran over the table and dripped on to his trousers. Suddenly he leaped to his feet, turning over my beer. "Well, gee! What are we waiting for?"

I dropped a bill on the table, and hurtled after him, collaring him at the door. "Hey, cut it, Jackson," I puffed. "Wait for all the facts, f'evven's sakes. Unless I'm mistaken the place in question is the one known as Francy's—"

"Yeah, on Beverly street. Let's go!" He was jittering with anxiety. Only then did I realize the pressures he had built up over this thing. But of course—Marie never did have the tact that Carole had. She must have pounded his ear by the hour. "But Henry—the place is closed. Out of business. *Kaput.*"

"It is? How do you know?"

"Carole told me last week. It's handy to both our houses—that's why Marie and Carole used it. But they didn't like it. Management changing all the time, and stuff."

"Godfrey—what are we gonna *do?*"

I shrugged. "Get back to work, that's all. Get on the phone there and stay on it until we find out who owns that place, and if we can get in to look it over."

"But gosh—suppose they've shipped all the equipment out?"

"Suppose they haven't. It only closed a couple of days ago. Anyhow—got any other ideas?"

"Me?" said Henry sadly, and began to slouch back toward the lab.

The Widget met me at the door when I got home that night. She put a finger on her lips and waved me back. I stopped, and she slipped out and closed the door.

"Daddy, we've got to do something about Mummy."

My stomach ran cold. "What's happened?"

She took one of my hands in both of hers and gave Carole's smile. "Oh, Daddy, I didn't mean to frighten you. Nothing's happened, on'y"—she puckered a little "She cries alla time—or almost."

"Yes, monkey, I know. Has she said anything?"

The Widget shook her head solemnly. "She won't. She sits lookin' out th' windy, and when I come near her she grabs me and runs tears down my neck."

"She hasn't been feeling very well, darling. But she'll be all right soon."

"Yeah," said the Widget. She gave me a strange, up-and-sidewise glance that brought back what Carole had said about the child's loss. "Widget!" I snapped: and then, seeing how startled she was, I went down on one knee and took her shoulders. "Widget—don't you trust me?"

"Sure, Daddy," she said soothingly. I once heard a doctor say to a patient, "Sure you're Alexander the Great," in just that tone of

voice. "So Mummy will be all right soon."

"That doesn't make you any happier."

Her clear gaze was searching. "You said she would be all right," she said carefully. "You didn't say *you* would make her all right."

"Oh," I said. "Oh." I stood up. "Turn off the heat, Widget, and stick around."

I found Carole in the kitchen, moving briskly. I could see right away the unusual fact that the chow she was rassling up was of the short-order variety. She probably hadn't started on it until I wheeled into the drive, which just wasn't normal.

She smiled at me with the front of her face and missed my hat when I tossed it.

"'Smatter, cookie?"

"Nothing," she said, and put her arms around me and began to cry.

I put my face in her bright hair. "That I can't take," I said softly. "What is it, darling? Still the thing that's gone?"

She nodded, her face pressed deep into my shoulder. It was some time before she could speak, and then she said, "It gets worse and worse, Godfrey."

"Just exactly what has changed, Carole?"

She shook her head in a tortured way, her eyes squinched shut, and twisted away from me. She stood with her back to me and her fists on her cheeks, and said, "Everything has changed, Godfrey. You, and I, and the Widget, and the house, and the way people talk. Once it was all perfect, lovely and perfect, and now it isn't. I don't know how, but it isn't. And I want it back the way it was!" The last words were a wail, the broken voice of a youngster who has lost his jackknife and was convinced until then that he was too old to cry.

"Come out here," I said gently, leading her into the living room. We sat on the couch together and I put my arms around her. "Darling, listen. I think Henry and I are on the track of this thing. No . . . no; don't. Pay attention." I told her all about how Henry and I seemed to have the thing pinned down to the beauty shop. "So this afternoon we got on the phone to find out who owned the place. We called general agents and the Chamber of Commerce and three guys named Smith. All blanks. We may or may not have a lead; to wit, four phone numbers that did not answer and one that was busy. Point is, we think that this goofy business isn't as mysterious as it pretends to be, and we think we can crack it."

She looked at me with all the world in her eyes, and poked my nose gently with her forefinger. "You're so sweet, Godfrey. You're so darned sweet," she said, and without the slightest change from the shape of her smile, she was crying again. "Whatever you do, you can't bring back the lost thing —mine, and the Widget's doll with

the g-giggum pinafore, and Marie's Henry-the-Hero. They're gone."

"You'll forget that."

She shook her head. "The farther away, the more it's lost. It's like that: don't you see?"

I leaned back a bit from her and looked at her. Her cheeks were a little hollow. I had only known her to be sick once in all these years, and her cheeks got like that then. I tried to look ahead, to see what would happen; and the way she had changed in these few days was frightening; so what would happen to her if this went on?

Almost roughly I put her by and and got up. "I can't take any more of this," I said. "I can't." I went to the telephone and dialed.

"Henry?"

"Is Henry there?" came Marie's voice tautly.

"Oh . . . hello, sis. No, he isn't."

"Godfrey, where's he gone?"

"Dunno. What's up?"

"Godfrey," she said, not answering. "Did he really hit Wickersham?"

Cautiously I said, "If you say so."

"I don't know what to do," she said desolately. "I saw him do it. But I can't understand why he is still working for Wickersham. I can't understand why Wickersham will have him, or how he can work for the man after what happened."

"Now look. You haven't been trying to get him to quit?"

"Well, I—"

I saw Henry's domestic economy going down in swift spirals. "Hands off, kiddo. I'm telling you, sit tight and don't push that kid around. Hear? He's got enough on his mind as it is." It was the old big-brother rough-stuff. I knew she needed it and I knew Henry couldn't do it.

"But where *is* he?" She sounded petulant but quelled.

"Probably on his way over here," I said on a wild guess. "I'll look out for him, don't worry; and I'll keep you informed. You curl up and unlax."

"All right, Godfrey. Thanks, honey."

Carole looked at me quizzically. "I'm hungry," I said. She gave me a wan smile, and a mockery of the mock salaam she used to tease me with. "Yes, master," she said and went out into the kitchen.

I was suddenly conscious of the Widget's level gaze. She stood by the hall door with her hands behind her, teetering a bit on her toes the way I used to before I realized she had picked it up.

"Are you just mad," she inquired, "or are you going to do something?"

"Is there always a difference?" I asked icily.

She annoyed me by hesitating. "Mostly—not," she said reflectively. Suddenly she was tiny and soft and helpless. "Daddy, you *got* to fix this!"

"Don't worry, bratlet. Mummy'll be happy again. Just you see."

"Yes," she said slowly. "Mummy'll be happy again." She looked extremely wistful as she spoke, and I suddenly got what she was driving at. "Aha! What, young lady, do you expect to get out of this?"

"Me?"

I laughed and held out my arms, and she ran into them. "Sweetheart, I will make you a promise about that doll. I won't get it for you unless I can get it for keeps. Understand? There'll be no more of this having-not-having, any more, ever."

And for once in her life, she kissed me instead of saying anything.

We sat down to a snack of toasted cheese and cocoa just as a violent knocking preceded Henry into the room.

"I—" he began between breaths.

Carole said clearly, "Beat it, Widget, darling. Take your plate; I'll take your cup. We'll fix you a party in your room."

Henry sent her a grateful look as she and the child left the room, and then burst out, "Godfrey, it's worse — much worse. Another single day of this and Marie and I won't have anything left. Godfrey, she won't leave it alone. She doesn't think about anything else but that crazy Wickersham deal. I've got to bust this thing open—or I'll bust."

I brought him a slug of rum. "That won't do any good," he said, and drank it down as if he were washing down aspirins. He'd never done that in his life before. "Godfrey, I've got to *do* something. Can't we go down and case that shop, anyway?"

"That's the first solid thing I've heard in a week," I said. "Let's go."

Carole came downstairs just then. "Call Marie, will you, honey?" I said half over my shoulder. "Tell her Henry is O. K. and he and I have gone to a wedding, or to get drunk, or something clever, will you?"

She nodded, and when we got to the door she said, "And where *are* you going?"

I blew her a kiss, and she caught it and put it in her pocket, the way she always did. As long as I live I shall never forget her standing there in the light, worried, and loving, and beautiful.

Out in the garage, we swung into the jalopy and I kicked the starter. As the motor roared, Henry leaned forward and shut off the ignition. "Has it occurred to you that we just might get in that place?" he asked. "Just in case, don't you think it would be smart to take a tool or two?"

"What do you know!" I said admiringly. "And I thought I was the brains of this combo!" We climbed out and raced back to my bench. My toolbox, a couple of wrenches, a flashlight and a battery operated trouble lamp with an extension cord. The little power supply gave me an idea; I pulled a small black case out of the rack.

"Inductance bridge," I said.

"Might be nice to have along. If that hair drier is what's caused this thing, it'll use power. It must be something new and it would be nice to know what's in it and where it's coming from."

"Good. Take your multi-tester, too. And here's a little slice bar."

Arms full, we staggered back to the car, loaded the gear into the back seat, and at last ground out of the garage.

We pulled up a block from the beauty shop, parked, and strolled up to have a look at it. The shop was on a side street. It was a sleazy-looking brick wart stuck on the off-corner of what looked like a block-long warehouse. There was a yard around its two open sides, and a brick wall with a silly-looking archway of wrought iron over the gate, forming the word "FRANCY'S" in tortured letters.

"Snazzy," said Henry disgustedly.

We paused outside the gateway. The side street was comfortingly dark except for a street lamp which was planted exactly in line with the gateway and the front door of the shop, throwing a path of brilliance up the cinder walk.

"That won't do," I said.

"It'll have to." He gave a quick look up the street. There were only two pedestrians in sight, and both of those were walking away from us.

I hesitated. "I don't—" There was something niggling at the back of my mind, but I couldn't place it. Something about a wall. Heck with it. "Come on."

We walked up to the door as if our intentions were honorable. A sign there said "Closed until further notice."

"That ties it," said Henry. "There is definitely something ungood about this thing."

"Why?"

"Ever see a rented place close up without some information as to who to call for purchase or rental or emergency or something?"

"Hm-m-m. Not till now."

The door was locked. It was a great big solid door. "The window?" Henry breathed. We went down the couple of steps that led up to the door. There was so much light from the street lamp outside the wall that when we turned off the path, the darkness was like tar and seemed almost as hard to move through. We felt along the wall, blinking, until we came to a window."

"Barred," said Henry, and swore. "Godfrey—can you stand by while I get some tools? No sense in both of us marching in and out of this place as if it were a gentlemen's lounge."

"O. K. A pinch bar, screwdriver, and . . . oh. Get the jack out from under the front seat, in case the window's clinched. The flashlights, the battery case, and the bridge."

"Holy smoke," said Henry. "You're a real second-story character."

"I'm a boy scout gone wrong, that's all."

He disappeared into the gloom. I lost him, then saw him silhouetted against the bright light from the open gateway. He went swiftly to the gateway, peered out to each side, and went through it. Behind me, in the dark, I heard the unmistakable sound of a relay.

If it had been a hand on my shoulder it couldn't have startled me more. I felt my way to the window, pushed my hand through the bars. There seemed nothing out of the ordinary about it. Feeling carefully along the lower sash, I touched three countersunk nail heads. I listened carefully, but could hear nothing else.

Henry got back in a couple of minutes, loaded to the ears with assorted equipment. I realized that the little guy just had to be doing something, whether it was useful or not. He came puffing and blowing through the darkness toward me.

"This way, Henry," I called softly. He bumped the side of the building with something of a clatter, and edged along until I said whoa. "Sweet Sue," he gasped. "Ain't I the eager beaver?"

"Why didn't you just drive in with the lights on and the horn blowing?" I griped. "You'd've had more fun with less effort. The blasted window's locked behind these bars, and nailed down to boot."

"Give me a flashlight," he said to himself, as he got from under his load.

"Oh; you don't believe me?" I asked, and just then the relay clicked again. Henry grunted, found the light, hooded it with his fingers and aimed it at the window. "Did I hear a relay?"

"You did. I heard it a couple minutes ago."

"Just fine," said Henry. "And any second now this place will be all bells and lights and cops. That was a burglar alarm you heard."

I clapped a hand to my head. "Burglar alarm! How could I be such a dope?"

"Godfrey; what are we gonna do?"

"Just say 'Open Sesame,'" I grinned. "Watch." He swung the light on me and I made a magician's pass at the window. Nothing happened.

"Well?" he said impatiently, and then the sash slid quietly up, there was a click, and the whole section of bars swung out from the wall.

"Cut off my shorts and call me leggy!" gaped Henry, a phrase he reserved for really special occasions. "*Our* burglar alarm!"

"Things begin to shape up," I said slowly. "Not in any way I like."

Henry's mind was evidently racing off on another tangent. "Wickersham installed this himself after we built it," he said. "He must know who owns the place. Hey—let's call him up and get the score!"

"No!" I said violently. You had to be violent with Henry when he

went off half-cocked. Harder to stop than any man I ever saw. "Figure it out for yourself. He wouldn't let us know where this installation was going when he put it in. So I don't think he'd let us know now."

"Why not?"

"That's what I'm trying to figure out. Henry, he ties into all this business in some way. Marie's hallucination is about him. The 'chromium helmet' hair drier smells very much like one of his psychosomatic snivvies; and here we find a device built in his shop and installed by him, guarding that hair drier—"

"—or where that hair drier was. I see what you mean. The crumb!" Henry clutched at my arm suddenly. "Godfrey! Remember the day he seemed to think it was so funny when he overheard us talking about the girls?"

"I should forget that. I don't think there's any doubt about his knowing something about whatever's wrong with them."

"The trouble we had trying to find out who owns this joint," said Henry reminiscently. "I'd like to corner that guy and find out what makes."

"Tempting," I said. "But I think it would be smarter to find out everything we can before we do that. We've got to crack our own safe, here."

"You were psychic when you thought of bringing the jack," Henry said. "We can stick it under the sash and run it up. Something's got to give, and whatever it is it'll let us in."

"Yep; bust the window frame and swing a piece of it in front of the black-light beam inside, huh?"

"I forgot about that. Let's see; why hasn't the alarm gone off yet, anyhow?"

"Don't you remember, dopey? It isn't designed to ring an alarm until that sash comes down—preferably on someone's lunch hooks."

"Oh, yes. And the beam behind is in case someone thinks to cut out the pane instead of forcing the catch. What happens if it's broken?"

"Conventional alarm; bell, lights, and so on. Hard to say how he's hooked it up. The window comes down anyway; maybe in time to catch some part of Joe Burglar. We also don't know exactly where in the window the inside beam is placed. It might be horizontal, vertical, diagonal, or any combinations of 'em. Fortunately there's only one projector."

"No wires on the glass, huh?" said Henry, throwing a thin beam up to the window. "Hm-m-m. You wouldn't have a glass cutter in your bag of tricks?"

"No, but I have something just as good." I rummaged in the tool kit and came up with a small three-cornered file. I broke it in two, cutting my thumb in the process. "We now have six glass cutters. Henry, see if you can find me a hacksaw."

He fumbled for a while and

finally found it. I began to work cautiously on the bottom sash, cutting upward through the wood on each side until I heard it nick the glass, and being careful to keep the saw well outside, so that it would not move in across the black-light beam. Then I took a piece of the file, and starting from one saw cut in the sash, scribed up, across, and down to the other cut.

"Bright boy," murmured Henry. "Now you break loose the cut-out piece of the sash, and most of the pane comes with it."

"In one piece, if I'm lucky," I said. "We'll have all kinds of fun if any of it falls inside. Window glass'll stop UV like crazy." I held my breath and tugged gently at the lower part of the sash, trying to keep the pressure even on each side. The little molding that was left came away with a gentle crackling; and then, with a very satisfactory single *crick!* the pane gave. It was quite cool that night, but as I put it gently down I wiped sweat out of my eyes. "That's my boy did that," Henry said.

"Now for that beam," I said. Wrapped in black cloth in the top tray of my tool kit was a glass tube containing several wires coated with fluorescin, which I used to test UV projectors. I took one out, a small one about eighteen gauge, and holding it by the extreme end, thrust it into the gaping window. "The wire shouldn't block enough of the beam to activate the alarm," I said. "And we just might be able to find out which is the projector side, and which the receiver."

I moved it slowly, keeping my hand well back; and suddenly the tip of the wire glowed greenish white, and I heard Henry's breath whoosh out. I circled the wire carefully, spotting the beam from edge to edge. It was, I decided, diagonal across the window; the beam had a rectangular cross section, and by watching the fluorescence of the coated wire very carefully, located the projector end of the beam. It was at the top.

"Made to order," I said. "Did you bring the . . . yes, you did. Good heavens, Henry; did you leave anything in the car?"

"Did you leave anything in your shop?" he countered, grinning. "Now, is there any way we can skin past that beam?"

"Nope. It's too wide. We'll have to cancel it."

"Easy to say."

"Easy to do." I had been plugging in wires to the battery case.

"What is that . . . a little UV projector?"

"It is."

"Oh. You're going to aim it at the cell. But—the intensity won't be the same."

"Doesn't matter. This gismo doesn't measure intensity. It's strictly an on-off proposition." I switched on the projector, tested it with the fluorescent wire, and then aimed it carefully down the place where the alarm's black-light beam should be. I took a flashlight in the other hand, and craning over the sill, saw the photocell built in

down near the floor of the room. I put my projector up against it, stood aside, and said "Come on in."

Henry, chuckling, hopped up on the sill and dropped inside. I handed up all of the junk we had brought, and then followed him.

"Let's find out where to shut this thing off," whispered Henry, casting his light around.

"No you don't," I said. "Shutting it off might actuate something too. Let the silly thing sit there and watch for intruders like it was told to." I carefully slipped my projector aside, keeping the beam on the cell until it was clear of the other projector, up over the window.

"Now let's have a look at this place." Henry swept his light around, keeping it low.

It was a small beauty parlor, rather lavishly fixed up for its size. There were several curtained booths, very tiny, all open, each with its chair and mirrored cubbyhole table. A half-partition separated the front part, which proved to be an office, from the rear; otherwise the place was one big room. Against the back wall had been wheeled an array of permanent-wave machines, two manicure racks, and a hose and spray gadget for shampooing.

"And there's the dewjaw that's caused all this trouble," I said, pointing my light at a lone electric hair drier.

We pounced on it. The headpiece was simply an aluminum shell with an open throat inside; this led down through a pipe to a casing in the base, in which, supposedly, were heating elements and a blower. "Turn it on," I said grimly, and went back to the window for some gear. Henry hunted over the drier until he found the switch. The quiet room filled with a low, rising whine which settled into a steady hum. "Better not stay too near it," I cautioned. I examined it from a distance. There was a chair under the headpiece; I tried to shove it aside with my foot, but it was bolted to the floor. "That's funny."

Henry turned and shifted a few other pieces. Except for the plumbing, everything in the place was movable but that chair. "I wonder what's the idea of that?" he murmured.

"That's the kind of thing we have to look out for," I said. "It wasn't done for nothing." I paused. "And another thing. Seems to me that even though this is a small place, it ought to have more than one drier. Does that mean that the one we're looking for has been moved out? Or is the one we're looking for one they couldn't move easily?"

"By gosh, it's bolted to the deck like the chair," said Henry.

"Let's do a job on it." We switched it off, got out some tools, and began to take the drier down. Off came the headpiece, the pipe, the support rod. I got the bolts off the casing and lifted the cover. Perfectly conventional blower and a half a dozen heavy nichrome

elements. The switch gear was, it seemed to me, a little heavier than it had to be, and so was the power line; but the Underwriters would never kick about that. The power cable looked ordinary enough, but something prompted me to nick it with my knife. I was surprised to find that under the flexible rubber insulation, it was web-shielded. I followed it to the wall; it was plugged into a standard socket, but there was a four-place receptacle next to it on the wall with two sockets unused. Why a special outlet for the drier?

Henry sat down in the chair and mopped his face. "Looks like a false alarm to me," he said, leaning back.

"I dunno. There's a couple of things—not too wrong, but—" I went back to the motor and blower-element assembly. It was still hooked up. I switched it on. It revved up, louder without the cover, a bit faster without the curved tube to resist the air flow. I stood up and walked around it. "Nothing wrong with it that I can see," I said.

Henry didn't answer.

"Henry!"

No answer. I turned my light on him. He was sprawled back in the chair, fast asleep.

"Well, I'll be flayed and flustered. Get up out of there, you lazy ape!" I went and shook his shoulder. His head rolled limply, and sudden panic crawled under my belt. *"Henry!"* I pulled him out of the chair. His legs half took his weight, and then buckled, and he fell with a thump to his knees. Instantly his head snapped up. He blinked foolishly into the flashlight beam. "Wh . . . what goes on? Hey?"

"Are you all right?"

He climbed slowly to his feet, passed his hand over his eyes. "Must've dozed off. Hm-m-m! Sorry, Godfrey." He yawned. "My knees hurt."

"Henry, what happened to you?"

"Hm-m-m? I'm all right. Tired, I guess. Look, let's go home. The pursuit of knowledge is all very jolly, but there's no sense us getting jailed for it."

"Pursuit of knowledge? What are you gibbering about? Here we're on the track of the thing that's possessed our wives and my kid, to say nothing of Wickersham—"

"Aw, why be vengeful about it? *Nil nisi,* and stuff like that there. Let's go home."

"Nil nisi . . . 'speak well of the' . . . Henry, I don't get you!"

"Well, gee; Wickersham dead, and the girls all right again—what are we hanging around here for?"

"What?" He sighed with an exaggeration of patience. "Wickersham is dead and Marie and Carole and the Widget are all right again. So why bother?"

"Wicker . . . wait a minute. How do you know? Who told you?"

"Why it was— He kicked off—

Well, what do you know! I can't remember. He's dead, that's all. And the girls are all right."

"Are they though? And what was wrong with them?"

"*I* don't know. Something they ate, no doubt. Why the third degree?"

"Henry, it just isn't so. If it is, you couldn't possibly have found out about it."

"Are you trying to make a liar out of me?"

"Here . . . here, Shorter-than-me; don't get your back hair up."

"Well, I don't have to stand here and listen to you tell me that something I know isn't so."

"You *dreamed* it!"

"I did no such thing!" he said hotly. "I know when I know something!"

I stared at him, and gradually I realized what had happened, though I hadn't the faintest idea how. The thing Henry had wanted most in the world had come true—for him. And it was infinitely important that he keep the memory, even if it could be proved that it never happened. Like the Widget's doll. Like Marie's wish-fulfillment that the little guy take a poke at someone bigger and stronger than himself, someone who awed him. Like Carole's . . . what *was* Carole's wish-fulfilling memory?

The chromium helmet.

I looked at the pieces of it, scattered over the floor, and then at the chair. A perfectly ordinary airplane-tubing chair, bolted to the floor. Bolted to the floor—why?

"I'm going home," said Henry sullenly.

"Henry old horse, stick around a little. I'm sorry, boy; really, I was talking nonsense; you're right and I'm wrong. Please stay and give me a hand. There's something I've just *got* to find out. Will you, kiddo?"

"Well—" he said, a little mollified. "Gosh, Godfrey, you never disbelieved me before. What got into you?"

"Oh, I guess I'm excited, that's all. I *am* sorry, Jackson. Will you stick around?"

"You know I will. I guess I got a little hot, too."

"Good boy." Inside me, growing every microsecond, was a hot, ugly hatred of Wickersham. I didn't know the "whys" of all this, but I grimly determined to go on learning the "hows" until I could figure the man's motives. And it better be an accident that our women-folks were affected.

I looked at the chair again. There wasn't a single electrical connection to it that I could see. I was tempted to run out the bolts, but the super-caution that was growing almost as fast as the hatred, made me stop and think. I turned to my little inductance-bridge instead. I'd rigged it up to spot pipes and wiring in the wall between my house and the garage, where my workshop was, for I sometimes did some rather delicate electronic work there, and didn't much care for stray AC and

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magnetic fields that I couldn't get rid of or locate exactly so I could compensate for them. It was a dual-purpose rig—the bridge itself, for detecting metallic masses, and a matched-choke circuit for finding wild AC.

I asked Henry to find me a broomstick, and fitted together the T-shaped probe, setting it on the stick. I plugged in earphones and the leads to an illuminated meter which I had fixed to strap on my wrist. I hooked the whole Rube Goldberg up to the battery pack and switched it on.

"Henry," I said, "that power line is shielded. Rip the receptacle out of the wall, bearing in mind that it's hot. You'll probably find a conduit in the wall that's grounded to one side of the power line. Cast it adrift for me."

I went over the chair carefully, looking for any induced AC. There were a few strays—not enough to amount to anything.

Why was that chair bolted down?

To stay in one place, of course. Why?

I switched on the blower, and went over it again. Nothing, until I had the probe over the headrest on the back of the chair. And the hum in my headphones suddenly faded. I moved the probe; it got louder. Which was just silly. The gadget was built so that when AC was encountered, the sound would intensify. I moved it toward the chair, and found a spot about six inches over the headrest where my signal utterly disappeared!

"There's something here, Henry," I called. "Just what I don't quite know. It acts like a very intense multi-phase AC; but I mean multi-phase. Some high harmonic of the sixty-cycle, phasing away like mad. It kills my detector signal completely."

"Your department, son," said Henry. "Don't double-talk me back to sleep. Tell it to Wickersham's ghost. You were right about this grounding here. What on earth's that for"

I didn't bother to try to answer. I was puzzling myself by moving the probe in and out of that dead spot. It didn't make any sense at all. The chair gave no sign of carrying a thing. I gave it up, put the probe over my shoulder to get it out of the way, and went around the chair toward Henry.

The phones faded and came in again as I moved.

I stopped dead and flashed my light up, moving backward until it happened again. The probe was eight feet in the air this time, and what I found was a weak place in the signal. I waved it around, walking back and forth, repeating the process I had used with the fluorescent wire when we were working on the window. I found the field—for apparently that's what it was—tightest at the spot over the chair, diffusing outward and upward toward the corner of the ceiling.

"What are you doing—catching butterflies?"

"Catching something. Henry, the chair, which isn't connected to

anything, has a field hanging over it which is beaming up into the air!"

"Wouldn't it be the other way around?"

"What do you mean?"

"Suppose the field over the chair is a focal spot?"

"It diffuses outward . . . oh: I see what you mean. Hyperbolic reflector." I went around to the other side of the chair and put the probe low. "You amaze me, my child! You're right! It diffuses downard on this side!"

I beamed my light upward to the corner of the room. It was no more remarkable than the other corners. The ceiling was decorated in bright gold stripes on dark cream paint. The moldings had been quarter-round plastered to get rid of the 90° angle of the walls to the ceiling, which gave the corners the inner surface of a quarter of a sphere. These were decorated with a series of close, fine gold lines—all that is, except the one that seemed to be radiating the haywire AC.

It was made of fine copper mesh

"By all that's putrid," Henry gasped. "A focusing radiator!"

"And unless I'm mistaken, the inductance bridge here'll locate a pipe from that exclusive little receptacle in the wall, smack up to it," I said excitedly. I went over there so fast I jerked the cable out of the battery pack and dropped my flashlight. Henry had left his on the floor over by the receptacle: we were plunged in total blackness, floundering and swearing. I heard Henry say "Here it is!" and the *click-clicking* of the hex head on the flashlight as he fumbled it and it rolled on the floor.

"Don't light it!" I said. "I see something. Wait!"

Silence as thick as the darkness settled over us. Vaguely, then, as our eyes became accustomed to the dark, we saw a purple glow down low, near the floor.

"UV again," Henry said, "with a cheap filter-lens." He clicked on his light. The place where we had seen the glow was at the base of the dim outline of a walled-up door into the warehouse to which the beauty shop was semidetached. "Now, that's silly," I said. I went over and confirmed my first glance: there was a small projector and an eye, the whole making a beam just long enough to cross the walled-up door. "Who's going to be walking through walled-up doorways?"

"Skip it for now, Godfrey. Check that beam radiator."

I went to the wall and began sweeping it with the inductance bridge. Sure enough; the volume-changes in my phones told me exactly the place where a conduit had been laid, from the receptacle up to the ceiling, and along under the quarter-round fillet to the corner and the wire-mesh snivvy.

"I begin to get it." Henry said. "The switch was in the drier. Start that up, and you activate the beam, which focuses on the head

of whoever's in the chair. Wickersham was a cute character."

"He sure is . . . was, I mean."

"Hey—was that thing on when I went to sleep in the chair?"

I thought fast. "Why no, Henry. Of course not."

"A good thing. I thought maybe it was. I'd hate to get a post-mortem kick from old granite-puss."

I changed the subject quickly. "Now, where's this rig powered from?" I got busy with the probe again, sweeping round and round the outlet. "The regular AC conduit is too near . . . no . . . I got it. Hm-m-m." Slowly I traced the field-interruption of the conduit along the wall, where it suddenly disappeared. "It's gone, right here," I said, pointing to the wall.

"That's right over the black-light ray—the walled-up door!"

I pulled off the phones and began to unstrap the wrist meter. "Henry, I'd say that if that electronic watchdog is there, that door opens. If that power line goes in there, we want to open it."

He nodded, and went for my little black-light lamp. We set it up to fool the photocell the way we had on the window, and then went to work on the nearly invisible door. We felt over every inch of it. There was a floor board in front of the sill with a comparatively wide crack between it and its neighbor; ordinarily it would have been in the black light for its entire length. I rested one hand on this board as I felt the door; the plank shifted a little under my hand, and without a sound the door swung inward.

"Give me your gun," I said clearly, and pounced on Henry and put my hand over his mouth before he could say "What gun?" "There could be someone in there," I whispered.

He gave me the four-0 with his fingers and thumb, and then aimed his light into the open door. Slowly we entered. I plucked Henry's sleeve, held up a halting palm, and trotted back to get the pinch bar, with which I jammed the door so it could not swing closed. "I've seen too many Karloff pictures," I muttered to him.

But the room was unoccupied. It was tiny—little more than a large closet. *"Wheee--ooo!"* Henry whistled. "Will you look at the *stuff!*"

It was a sight to gladden the heart of an electronics man. An oscilloscope with an eight-inch screen. A vacuum-tube voltmeter. The biggest, fanciest multimeter I have ever seen. An electronic power-supply control. Rolls and skeins of hook-up wire and shielding of all kinds, colors and sizes. Blank panel plates; knobs, dials; racks and racks of tubes ranging from peanuts to doorknobs. An elaborate transceiver. A bakelite-surfaced work table with power outlets spaced all around it, marked for every standard voltage, AC and DC, that I ever heard of anyone using and some I hadn't thought about yet. A vast color-indexed file of resistors and

capacitances. A big commercial tube-tester. Floor to ceiling, it was packed with electronic treasure.

"I love my wife," said I archaically, "but oh you workshop!"

When we had gotten our breath back, Henry asked, "That drier rig still running?"

"Yep."

"Then would that be the transmitter of that beam?" He pointed to a small chassis with a cluster of tubes which glowed, and a huge transformer that hummed softly. "Will you look at that spaghetti," I breathed. "All spot-welded; not a soldered joint in sight!"

"This must be it," said Henry, poking a device on the bench; a handle with two tiny gray electrodes, one detachable. "Oh, what I wouldn't give for—"

"I know it's tough," I said, grinning, "but leave us keep our mind on our business. Let's look this thing over."

To go into detail on the tests we made of that rig would not only be tedious; it might be dangerous. The principle, when we finally isolated it—and only with that splendid equipment could we have done it—was startlingly simple. I'd hate to have the job of making that hyperbolic web transmitting antenna, but like Columbus' egg trick, it wouldn't be too hard to duplicate once you got the idea. As for the beam itself, it was transmitted at such and such a mixed frequency, with harmonics, and with ninety and one hundred eighty degree beats to the fundamental *and* to certain of the harmonics, at such and such a wattage, with a so-and-so field tension at the focal point. The output stages had a wave-form like the first act of Disney's "Fantasia" run off in forty seconds.

I tell you; I feel about this thing the way I did when I was in war work, and some of the bright boys came up with gismos for mass production that had been regarded as impossibilities in all the best people's books. Once in a while, in those days, you'd bump up against another electronics engineer whom you knew would be absolutely fascinated with the work you were doing. And because of military security, you had to keep your lips buttoned. But the pressure behind the button was something fantastic. That's the way I feel now. But I ardently wish I didn't know about it, or that I would quickly forget it; because that wave-form, at that power, at the point of focus, is the most utterly horrible thing I can conceive of.

After hours of concentrated work—and the effort it took to keep away from entrancing sidelines was no small part of the concentration—we got the final output wave-form on the 'scope. "That's it," I said.

"And it's all yours, Ameche my boy," said Henry, watching the complex thing writhe and shimmer on the screen. "All I want to do is put tomato sauce on it and eat

it. Now we've got it—what do we do with it?"

I stared at the thing on the screen. It was hypnotic, with that self-inverting three-dimensional effect that a cathode image has. "Only thing I can think of is to throw it around one hundred eighty degrees out of phase and re-radiate, focusing at the same point as the beam out there until it cancels out. Or until it over-compensates and undoes the harm it has accomplished. But we've got to . . . to try it out on someone."

Henry's eyes glinted. "Maybe we could snatch a body?"

"We've got to do something."

"Why bother? You've had your education. The girls are O. K. and the Wick is dead. And I'm hungry and sleepy and I got to work in the . . . work in the—" His voice faltered. "Godfrey, I must be tuckered out. I can't seem to remember who we work for, now that Wickersham is—"

"Don't worry about it," I said gently. "We have a little more to do here. We've got to knock together an inverter."

He spread his hands. "But why?"

"Please, Henry. For me. This once," I pleaded with him. "Holy smoke; we've come so far on the thing. Let's round it off."

"Oh all right. Jee-hoshaphat; you're worse than Wick used to be." He pulled out his watch and gaped at it. "Quarter to—" His eyes bugged. "Godfrey! It's quarter to *six!* In the morning! The girls—they'll be half nuts!"

He scrambled to the bench. There was a dial phone there. He snatched it off the cradle and jammed it to his ear, waiting for a dial tone. I saw him go white, and suddenly his eyes rolled up and he slumped to the floor, the telephone falling on the bench on a tangle of rubber-insulated wire. I stooped and half-lifted him, looking wildly around to find somewhere to put him. There was nowhere, so I straightened him out on the floor, and picked up the phone.

"—and a gross of 6SJ7's," said the phone. "And have you made up my silvering solutions?"

"Yes, *sir,*" said another voice.

"All right. I expect that shipment before eleven o'clock." The line clicked and went dead. Carefully I hung up the phone.

Wickersham's voice! It was obviously a bridge phone to his office; and Henry, listening for a mere hum on the phone, had heard it—heard the voice of a man whom he thought dead. And it was infinitely important to Henry that he believe Wickersham dead. It was about the most important thing there was.

I knelt beside him, pitying him more than I can find words to describe. Poor little, cheerful, chubby Henry! The guy just didn't deserve this kind of thing; wasn't equipped to handle it.

I chafed his hands, and suddenly he tossed his head restlessly and batted his eyelids. "Go to sleep," I said softly. "Go on."

Perhaps he was tuckered out physically and emotionally, or perhaps he was hyper-subject to hypnosis because of what the beam had done to him; but he began to relax almost immediately. I put a roll of rubberfoam cushioning under his head and he sank into it. Once he opened his eyes very wide and said "He's just *got* to be dead!" I said, quietly, "Sure. Sure. Sure." And he went to sleep.

Then I went back to the bench and got to work.

My eyes had begun to blur, but I tried to ignore it. When it got too bad I went out into the beauty shop and walked up and down, fast, turning circuit diagrams over in my mind; and then I would rush back in and go on. My feet hurt and my back hurt, and I was hungry.

But I finished the rig, and hooked it up, and hung the 'scope on it, and it worked. The strange wave-form of the beam transmitter dwindled under the matched out-of-phase signal of the inverter; subsided, receded; and it looked as if I had it whipped. I had everything I needed but a guinea pig.

I had begun, by then, to fully understand the function of the beam. It took the ego's most heartfelt wish, and made it an accomplished fact; a thing which, to that ego, had actually happened. But because it was such a wanted —such a *needed* thing—the inevitable reaction was a tearing sense of loss. When contradictory evi-

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dence piled up, when the same senses that had, subjectively, told that ego that the needed thing was true and then that it was not true, the struggle between them was more than a human mind could cope with. There was only one surcease—another treatment under the beam. And then another. And never in human history has a more torturous instrument been devised. It was worse than any drug; for the drugs killed logic, but this thing *used* it, in opposite directions at the same time in the same mind; and the stronger of the two was that which was refuted by the most evidence.

What could I do? Whom could I use the thing on, when I knew as a technician that I had the antidote, but did not know as a physician or psychiatrist what the result would be? There was Marie. And Carole—and what strange battle was she fighting? And the Widget. And Henry.

I looked down at him, curled up on the floor, coffined and shrouded with the utter sleep of the exhausted. I could expose myself to the beam; but how did I know what my deepest desire was—what the direction would be of my wishful thinking? Did anybody really know that? Exposure to the beam had turned Henry against any further research; apparently he had wanted the reasons for that research removed more than anything else in his universe. There was only one alternative to doing the work, and that was to believe it done, which was the course his mind took. And as he lay there sleeping, he still believed it, and would if I woke him and asked him to handle the controls while I tested it on myself. He'd refuse. I might be able to argue him into it; and if I did, how could I tell what would happen to me? Would I forget my discoveries in this devilish field, and condemn us all to the madness of some concreted dream?

No; I held too much responsibility. I couldn't try it on myself. Carole, then. A wave of sheer horror nearly stopped my heart at the thought. Marie—my sister.

Oh, you just don't do those things! No human being should be faced with such a choice.

The Widget.

Grave and clear-eyed, and sometimes so surprisingly adult, and all the while such a kid, such a baby, so little.

Why not the Widget? The thought came strongly—why not any of them? Didn't the oscilloscope say that I could negate the beam? I could start with the gain away down out of sight, and increase it slowly, micrometrically, with a vernier. Weren't the chances in my favor?

I was filled then with self-disgust. I didn't *know* enough. Surely I could have learned enough about the physiology of the mind to be able to judge what would happen, have some small guide—even increase the odds in my favor, large as they were.

This was silly. Of course they'd

be all right, no matter which one I treated first. But—failure. Any failure. Carole with dementia praecox. The Widget a cretin. Marie a paranoid. Henry, drooling and having to be fed.

Henry. He never did look his age, and asleep he looked like a nine-year-old—a chubby nine-year-old with a two-day beard.

The decision came smoothly, and without effort. I just suddenly knew it would be Henry.

"Come on, boy. C'mon, old hawss." I got him under the armpits and heaved him up. He lolled against me, got his feet under him and walked blearily as I led him. I took him out into the beauty parlor and said "Siddown, you," and grinned as I shoved his chest and sat him in the chair. That's when he really woke up.

"What'sa big idea? In the chair —hey! Godfrey! What are you doing? You dope, the beam's going to—"

He began to struggle. He said, "You've gone crazy, just the way we're all going to go. Wickersham's dead, you fool; you don't have to do this." After that he didn't talk. He fought. Once he got out of the chair. I didn't hit him until I had him back in it, although he kicked me. When I had him in the chair again I brought up the heel of my hand and caught him under the chin with it. It closed his mouth with an astonishingly loud snap, as his teeth clicked together. His head went so far back against the rest that I thought I had broken his neck. I hit him very hard. I backed off from him, sobbing for breath, and when I had some air I went back and straightened him out. He moved his head a little and moaned, and blood came from his mouth, so I knew he was all right although he must have bitten his tongue.

I limped back into the shop and threw the master switch on the projector. The silly little hair drier motor began to whine like wind around eaves.

I watched the 'scope, and when the wave form of the beam was fully formed, I switched in the plate voltage of the inverter, and started to crank up the gain. It was a feather-touch, a very little at a time. I had my hand braced solidly on the bench top, with my thumb and forefinger just touching the knob; and I brought up the gain only until the first effects got noticeable on the shimmering screen. Then I cut the master switch and ran out to Henry.

He seemed to be asleep, quite normally asleep, and very happy. His smile was all the more cherubic because his lower lip had started to swell, and blood ran freely out of the corner of his mouth. I shook him, and he awakened instantly, opened his eyes, grinned and then winced.

"Godfrey . . . what hap—" He put his hand to his mouth and stared at the blood on his fingers, and then at me, and fright grew in his eyes. He leaped to his feet and stared around him. "Godfrey! Where are we? What are we doing here? What's happened to me?

Is this a hospit— No; it couldn't be. Is it morning?"

He shuddered, and I had to guide him back into the chair as his legs started to tremble with weakness. He went back into the chair without the slightest recognition of its being anything but a chair. The blood on his chin looked very red as the weakness bleached his face. I found a handkerchief and wiped it. It didn't do much good.

"What's the last thing you remember? I'll tell you everything I can from then on."

"Remember? I can't . . . I was—" He leaned forward and put his forehead in his hands. He spat, and grunted. "I was walking down the back road, going to your place. Was I hit by a car?"

"What had happened before you left your house? Do you remember?"

"Yes," he said slowly. "Marie . . . wouldn't stop talking about the . . . time at the Altair when I hit . . . when she thinks I—"

"Yes boy. I gotcha. I can tell you everything. One more question. Where's Wickersham?"

"Hm-m-m? Search me. The skunk. Down at the lab, most likely. Why?"

I realized I had been holding my breath, and let it out gratefully.

I had succeeded, and I had failed. My out-of-phase component wiped out the beam effect. It had also wiped out everything else—but completely. Like a refinement on the electric-shock treatment. Sweat ran down behind my ears as I thought of what might have happened if I had not used such a feather-touch on the gain of the inverter. How, without experimentation, could you judge the relative resistance of various minds? Would a woman's mind resist less, or more? If less, the danger was too great; the effective increase might be geometric, or exponential. If more, how judge the increase? My choice was, if anything, worse than it had been before. And yet—what could be worse than a loved one slowly going mad before your eyes? It would take so long.

I sat down on the floor, and Henry slumped in the chair, occasionally touching his swollen lip tenderly, and I told him everything that had happened. It was an astonishing thing for him, and for me too, to see his amazement at our burglarization of the premises, and my account of his violent contention that Wickersham was dead.

When I had quite finished, Henry said, "Well, we'll have to try it again."

"On whom?"

"Me, of course. Who else?"

"Henry, you're crazy! I can't do that to you any more!"

"Why not? You had reasons for choosing me in the first place: they still apply."

"The most important one doesn't —you weren't responsible enough to control the experiment, because of your fixation that the Wick was dead, and that therefore the experiment was unnecessary."

"Godfrey," said Henry, grinning with the part of his mouth he could

still move, "you big lug, how am I going to handle you if you get as violent as I did?"

"That's right," I said.

I didn't decide, though, for all the time that we spent in the shop, going over circuit diagrams, our tired minds refused to help us out much.

"We've got to hit it from another angle," sighed Henry after a particularly circular argument involving current versus impedance versus capacitance. "If we only knew something about the mind, something that would give us a hint as to what frequency does what to which part of the brain, to yield a clear, undistorted hallucination like what we're faced with."

"And then we'd know what we could do to distort it. Yeah." "Distort it," I said again.

Suddenly I was on my feet and a banshee yell was ricocheting off the walls. "For Heaven's sake, Godfrey," Henry said, startled. "Don't *do* that! Remember the neighbors!"

"That's it!" I chortled. "That's it! Distortion. Distortion, you idiot!"

"Now wait. I think I— Distortion?"

"Of *course!*" I grabbed his arm and hurried him over to the bench, and started hauling out coils and sockets and resistors from the racks. "Distortion's much easier to handle than output! I can blend in any aberration to that wave form—from this to that, from now till then! That's our cure: it's got to be. Don't you see? The hallucination is induced by a wave—and its result is a picture with no distortion whatsoever. Not even facts can distort it. While it lasts, it is clean, consistent, flawless. It's perfection —something we're not geared to take. Hence the sense of loss when it's gone, and the violent subconscious drive to rationalize it or to get it back. Distort the wave ever so slightly, and it's no longer perfect. It becomes more real, but you can live with it."

"Well, I will be . . . but how will you know how to distort it? I mean, what part of the wave should you distort?"

"It doesn't matter, don't you see? The very nature of perfection dictates that. It doesn't matter where it's spoiled—it's still spoiled!"

Henry's eyes glowed. "And if you distort just a little more, it'll get fuzzy around the edges. Out of focus. It will be a . . . a—"

"A dream! Of course, and can be disposed of as such. Let's go, muscles; I think we've got it!"

I rigged up a simple oscillator circuit and hooked it to the Oscilloscope. I got a spot on the screen and, carefully working the horizontal and vertical deflectors, got a nearly perfect ring.

"Now watch," I said. I turned up the gain. The ring expanded. I turned it up more—a little more —suddenly the edge of the ring quivered, zigzagged, and spread out, throwing out a little nutating finger of fluorescence. "There she broke." I checked with the vacuum-tube voltmeter, and noted the read-

ing. "That's about the effect we want, on the overall wave structure of that blasted beam."

"Can do?"

"Can do," I said, "and a darned sight easier than the inversion."

In a very short while, with the aid of the little spot welder, we had the rig set up and ready to roll. "It's safer," I said. "Bound to be. There's so much less to be done to get the effect."

"Here I go," said Henry, and started toward the chair.

"Now wait. You know I've got to give you a shot of the original beam first."

"Why sure. How else you going to cure me if I don't sicken first?"

He went out and sat down. "Shoot the sherbet to me, Herbert," he said languidly.

I went to the door of the little shop. "Henry, I can't."

He reared up and peered around at me. "You doubtful about whether I should do this?"

"Yes!"

"Well, I'm not. You're of two minds; one says I shouldn't, one says I should. I got one only, says I should. You're outnumbered two to one." He turned back again, put his head against the rest, and closed his eyes.

I swore violently. But what can you do with a guy like that? Finding it a little difficult to see, I flipped on the master switch. The drier motor began to moan. It annoyed me more than I like to admit. I had meant to short it out half a dozen times, but never got around to it.

Henry didn't move and when I got out to him he was asleep. I went back and opened the switch. I dawdled. I was frankly afraid of what might happen to him. When I got out again he hadn't moved. He was sitting with his eyes open, smiling happily at the far wall. When he saw me he jumped up and took my hand warmly. "Well, you did it!"

"Did what?" I asked stupidly.

"I'm cured! I feel fine! It worked, didn't it?"

I opened my mouth to tell him exactly what stage he was in, but decided not to. "I have to give you the 'clincher' shot," I said instead.

"What's that?"

"Why the first one cures you; the second makes it stick," I explained, hoping earnestly that he wouldn't start to think about it.

"Oh," he said, leaned back in the chair and closed his eyes.

I nosed into the 'scope and threw up my circle. I figured that was easier to watch than that burbled-up beam wave. I threw in the beam projector, and after it was well warm, started to move in with the distortion. I didn't dare put in too much. Maybe the brain would be insensitive to an over-distorted wave: and then again may be Henry'd spend the rest of his life with Lobblies following him. When the upper edge of the circle began to flatten a little, I stopped and sweat a while, and then gradually eased it in until the ring broke.

Then I cut everything, and, frantic with worry, ran to Henry.

He lay very still. I called him softly and he didn't move. I tentatively touched his shoulder. To my infinite relief his eyes opened and he grinned thickly at me through his swollen lips.

"Well, did it work?"

"What?" I asked tentatively.

"The cure."

"What do you think?"

"I don't know," he said, and yawned and stretched. "I had a dream about . . . Godfrey, what was my fixation that time?"

"I think you're cured," I said happily. "What was your dream?"

"Well, a fuzzy sort of something about being cured. But of course, if I was going to dream at all, that would be the logical thing to dream about."

"Why?"

"Because it was uppermost in my mind. The most important thing."

"That was your fixation—that you were cured. The logical thing to have a fixation about. I had to lie to you to make you take the cure. You believed you were cured as soon as you were 'sick'!"

And then I phoned.

I made sure the phone was clear, and then hurriedly dialed. The phone barely had a chance to ring before Carole answered.

"Carole, darling!"

"Oh Godfrey—are you all right, sweetheart?"

"Hungry and sleepy and tired. I love you. We've whipped it! We've fixed it! You'll be all right, dear. Listen. I have to get off this phone but quick. Collect Marie and the Widget and get down to Francy's fast like crazy."

"Oh, darling—all right. Right away, soon's I can get a cab. Marie's here. She's been wanting to get the police all night. I wouldn't let her."

"Bless you! 'Bye!" I hung up. Henry was practically jumping up and down in his impatience to get on the phone and talk to Marie, but I put it behind me. "No you don't. You'd get to billing and cooing over the phone and Wickersham would ring in on you. We've got to get them taken care of first."

We gathered up our tools and I took them out to the car: I was no Mr. America, but Henry looked like a meat-scrap. I took the precaution to go in and out through the window after nullifying the U V. I wasn't going to issue any invitations to Brother Wickersham, if he didn't already know we were here, which was doubtful.

But when the girls arrived, I felt I could forget about that. They came running up the path from a taxi, the Widget winning by seven lengths. I caught her up and hugged her till she grunted, and then slung her over one shoulder while I hugged Carole. I didn't look to see what passed between Marie and Henry, but it must have been something similar.

We trooped into the beauty shop. "Marie first," I said. "You've earned it, Henry."

"Aha!" grinned Henry. "It's a privilege now!"

"I'm sure of my stuff now. Come

along, Carole, Widge!" I led them into the little laboratory. They both watched with some fascination as I switched on the heaters.

"O.K., Godfrey," Henry's voice floated in. I switched on.

"Watch the ring," I said to Carole. "When it breaks a little at the edge, Marie will forget that that thing happened. I mean, she'll remember it didn't happen. I mean—"

"I know, dear." She sighed.

"Hm-m-m! Why the sigh?"

"I was just thinking—she has a real something to lose. So has the Widget. Oh, I'm sorry, darling. I didn't mean to—"

"Skip it. You'll get a treatment. I have the littlest hunch why you reacted the way you did to this thing . . . oh, I can't explain it all now, beloved, but I will. In a roundabout and rather agonizing way, I've been paid a wonderful compliment."

"I don't understand."

"You will."

"Daddy, where's the cormium hemlet?"

"Busted, finished, and fixed for good," I said. "Hey you. Your Daddy did something about it. That suit you?"

She looked me over. "S'about time."

"*Widget!*" said Carole.

"Mummy, every time you take to cryin' around the place, I'm gonna be mad at him. Mostly I don't know why, but I know men cause womenses tears alla time."

"Are you precocious, my darling daughter, or are you quoting Mrs. Wilton?"

"Mrs. Wilton," said the Widget. She considered for a moment, and then said, "Maybe I'm precocious, too."

Just then the nictating ring on the oscilloscope's screen wobbled and frayed at one edge. I cut the master switch. "Cut!" I called.

There wasn't a sound from the beauty shop. I ran out there, did a quick pivot and came back. "Marie and Henry," I said around the tongue in my cheek, "seem to appreciate each other again." Carole smiled. It seemed I had been waiting a long time for that smile. I kissed her. "Go on out there now. Do what Henry tells you. When you come back here, I dare you tell me you're frightened of anything."

Completely trusting, she went out. I held on to the child when she tried to follow.

"O.K!" called Henry after a minute.

"What's Mummy doing?"

"She's taking a two-minute nap where the helmet used to be," I said as I threw the switches.

"Kin I?"

"Are you good?"

"Well . . . I dunno. I busted your shaving mug."

"Oh-oh."

"But then I took care of Mummy when you stayed out all night."

"What did you do?"

"I told her you was wonderful."

"You did? Bless your little heart!"

"Shucks. It's no more than you tell her yourself."

"Think we have her fooled, Widget?" I asked, laughing.

"We wouldn't if she thought how bad we were instead of how good we are."

"Now there you have something."

"Cut it," Henry called.

"Now you beat it. G'wan; scat, now!"

"Aw. Just 'cause you and Mummy's going to get mushy."

"Yes, darling. Because me and Mummy's going to get mushy."

And we did. One look at those unclouded eyes, and I knew that she was all right again.

"A dream, darling," she murmured when I let her. "A silly dream. And I can't even remember what it was about. It was a dream that was—just like all of us, you, and me, and the Widget. I can't think why it was so bad."

"I know, now," I whispered. "Tell you later."

I went to work on the Widget's treatment, and when I got Henry's all clear, I went out there with Carole. The child was fast asleep, smiling. Carole leaned over and kissed her.

"Moh-mee?" she said with her eyes closed, the way she used to when she was half her age.

"Hello, Widge," I said.

"Hi." She knuckled her eyes.

"Have any dreams, sleepyhead?"

"Mmm—hm," she said with a rising inflection. She looked at me with eyes suddenly wide-awake and cautious.

"Go on, kiddo. The lid is off," I said. "You can talk about it now."

"You know everything, don't you, I bet. I dreamed about that ol' doll."

"Was it a dream?"

"Yes. It was a dream. But I'm going to pretend she was real. I wish she *was* real, that's what I wish."

Carole and I exchanged a startled glance.

"*And* I wish Mickey Mouse was real too. Mummy!"

"Yes, darling."

"I din't have enough breakfuss."

The Widget was all right.

"What's going on here!" roared a resonant baritone.

We all froze. "Wickersham," Henry whispered.

"Who's in there?" bellowed the voice.

"Your man Godfrey," I called. "Come on in."

He came striding in, tall and wide and black. The Widget scuttled close to her mother. Nobody else moved. Wickersham was halfway across the room when he saw Henry. The blood on Henry's clothes diverted him a little; he broke stride. He seemed a little less tall, then, as he stopped and swung around, looking at Marie, and Carole, and at the Widget, who twitched, and then at me.

"Company," I said. An idea crawled out of the back of my mind and out my mouth. "They're cured," I said quietly.

Wickersham's mouth sagged. His

eyes darted to the women and back to me. I saw Henry go white.

Henry said, "You knew, then. You did it to them."

"Yes," Wickersham said. He said it to me.

Henry stepped up to Wickersham, who towered over him. Henry had the most extraordinary ripple running on the side of his jaw. "Put your hands up," he said, his voice half a plea, half a caress.

Marie said "Henry." Carole took Marie's arm and shook her head at her.

Wickersham glowered suddenly, reached out one long arm and put, rather than shoved, Henry behind him.

"The cure was his idea," I said, indicating Henry.

Wickersham turned and looked at Henry as if he had never seen him before. "You? *I* couldn't do it!" he rasped.

Then Henry hit him. Just once. Very fine.

After that, Wickersham was easy to talk to. He slumped on the edge of one of the sinks, with his chin sunk low, and he talked. I couldn't look at him. I didn't know him like this. It hurt, in a way. I think I felt, then, a thousandth part of the loss all the others had felt over their solidified dreams.

"I didn't mean it to come out this way," said Wickersham. "The wish-fulfillment synapses are what I was after, it's true. I wanted the brain, under that beam, to become a perfectly efficient machine. I wanted to visualize a goal, and then under the beam, to see the whole thing completed, with all of the intermediate steps obvious. I didn't know it would do what it did—and it only had to do that once. I didn't know it would drag something up out of the subconscious, make it real, make it so desirable to return to and so difficult to get along without. I couldn't get free of it. I hated to permit myself to go back to it again, and I couldn't bear to be away—I missed it so much."

"What made you subject these women to it?"

"Because of you," he said. "You two are the best team I have. I didn't feel I could persuade or drive you to the cure I needed. I didn't feel you would drive yourselves to the needed extent unless you had a personal reason for doing it."

"That may be true, Henry," I said.

"It isn't," said Henry clearly. "He couldn't bring himself to admit to us that he was under the influence of a hellish thing like this. Isn't that more like it, Wickersham?"

Wickersham didn't answer.

"What about that fantastically childish business with the burglar alarm, and all the U V?"

"It had to be difficult for you all the way, or you wouldn't have had the push to go all the way."

"Nonsense," said Henry. I looked at him in amazement. I'd never seen Henry like this. He said, his

voice challenging, "You tried to do it and failed. You liked to think of us as lesser men than yourself. If you couldn't do it at all, you didn't want us to do it easily. Right?"

"I—didn't think it out that way."

Henry nodded. "And you want the cure."

"Yes," Wickersham whispered. "Yes—please."

I felt ill. "Do you own this place?"

"I bought it when I saw your wives going there."

Henry's jaw twitched again. "The secret," he said evenly, "is to feed your beam signal back a hundred and eighty degrees out of phase. About fifteen percent reverse feedback. For about fifteen minutes. Le's go, chillun."

They moved away from him, all but huddled in a group, toward the door. I stood where I was. Wickersham didn't move. I looked and saw Carole lingering at the door. When I turned back, Wickersham was looking out the door—not after anybody; not at anything. He was just looking. His great stony face was full of hollows in the wrong places and the shadows were no longer impressive, and distinguished, and strong. The eyes were red-rimmed, pale and yellowed.

"What was your dream, Wickersham, that you couldn't control?"

He made a movement with his head, a very slight one; but it pointed at Carole, and answered my question. I took a step forward, furious, but he said, "No. Not her. Just—what you have."

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And I couldn't pity him; he was so broken.

So I left him there, looking as if there were nothing alive but his eyes, and they were tied to the dead rest of him. I caught up with Carole at the path, and we walked quickly until we joined Henry and Marie. She was walking in a new way for her, not looking ahead, but holding her husband and watching his face, because she had seen her dream come true and was permitted to believe it. I put my hand on his shoulder. He stopped as if he had been waiting. Carole took Marie's arm, for she always understood these things without being told about them, and walked ahead.

"Henry," I said, "You just killed a man."

"He won't die."

"You know what that out-of-phase will do to him."

"You told me what a microfraction did to me."

"And he'll get fifteen minutes. There won't be anything left."

"What's he got now?" asked Henry.

"Very little," I admitted.

"He'll be better off after the treatment," he said steadily.

"Henry, I—"

"You could have told him the other treatment," he lashed out. "What would he have then?"

I thought of the Wickersham we worked for; silent, morose, efficient, and certainly not much use to himself. "I don't know why you did it, Henry, or why I let you. I think it's right, though." I also thought that for Henry, this was fighting; it was reprisal, and he would have to fight for everything after this. I could tell by the way he walked, by the way Marie walked with him.

We got in the car and took Henry and Marie home; and then at last we were alone—with the exception, of course, of the Widget, who was doing nip-ups in the back seat.

"Godfrey—what was the matter with me?"

I grinned. "Nothing."

"Nothing? Darling, you needn't try to hide anything."

"I'm not, Carole. Really I'm not. There's only one answer to the way you reacted to the opportunity to know your innermost desire."

"Well?"

"You just didn't react. You had everything you wanted. You were completely happy with what you had. You are a very rare creature, m'love."

"But I don't see why that should have made me so sickeningly sad—and frightened."

"The sadness wasn't much of it. You had your happiness brought to perfection, which is an unnatural state. But your memory of that perfection was so close to reality that you couldn't tell the difference. It was a very slight difference. It was every wall in the house without a fingermark on it. It was being able to close the oven door without the danger of getting your skirt caught in it, ever. In your particular fugue, only the little, unnoticeable details changed. It was perfection itself you thought you had known, and the lack of it that

gave you the sense of loss. And when you felt you had lost something, and couldn't identify it, you were afraid."

"Oh—I see," she said thoughtfully. "Why couldn't you tell me before?"

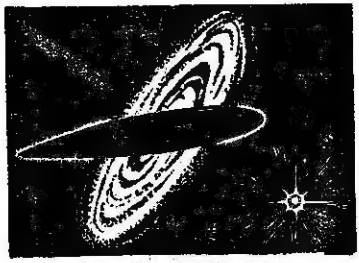
"Didn't want to rub Henry's nose in it. You see, like the Widget, who wanted a doll, Marie wanted an aggressive husband. Marie and the Widget were both mourning the loss of the thing they wanted. You didn't lose anything; you were just afraid. Your not losing anything is the compliment I mentioned a while back. But darling, compliment me in a less roundabout way next time!"

"I love you," she said, with her eyes too.

"That's what I meant," I said, and began to drive with one arm.

There was a snort from the back seat. "What—again?" said the Widget.

THE END.



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Secrecy and Death

(*Continued from page 5*)

which was selectively absorbed by cancer cells, harmlessly or not—even if the original compound actually stimulated the growth of the cancerous tissues—we'd be on the main-line road to conquest of cancer. Some modification could be made that would do the necessary job; to enter the bloodstream, permeate the body, and selectively enter and attack cancer cells wherever in the body they might have located.

Surgery is not the right answer. It can not locate and destroy cancer cells that, having broken away from the parent mass, have settled down somewhere else. Radiation isn't the right answer, except for skin cancer. Deep cancers can not be reached by the radiation without damaging the normal tissues through which the rays must penetrate.

Two things—available easily today—are necessary to launch a completely successful attack on cancer. One is money. If two dollars for each person in the United States were made available for cancer research, the problem would be solved—and probably within three years at the most. It took only three years to solve the problem of the atomic bomb.

The second necessity is free use of data and materials made available by the tremendous neutron beams from the atomic piles. The fundamental of all organic chemistry is carbon; nitrogen, when exposed to heavy, powerful neutron beams, yields, by transmutation, a radioactive carbon atom, $_6C^{14}$, with a halflife of 1000 years. It cannot be prepared practicably by cyclotron; the atomic piles can prepare it with ease and in quantity.

That research tool is, however, denied medical science today. The Army has decided that atomic research is exclusively a military procedure. One of the Manhattan Project biologists had two papers to deliver at the Atlantic City Cancer Symposium. The Army would not permit him to deliver his speeches; his research had been done with the aid of the great uranium piles and the powerful, plentiful radioactives they deliver.

If the Army's got to have the power of blocking scientific research and the right of free speech, for God's sake, put the atomic project under the surgeon general's office!

If you think the point doesn't apply to you personally—look up the cancer statistics, keeping in mind that the tendency to cancer susceptibility is heritable. There are a number of things worse than being killed in a microsecond by the flash of an atomic bomb.

THE EDITOR.

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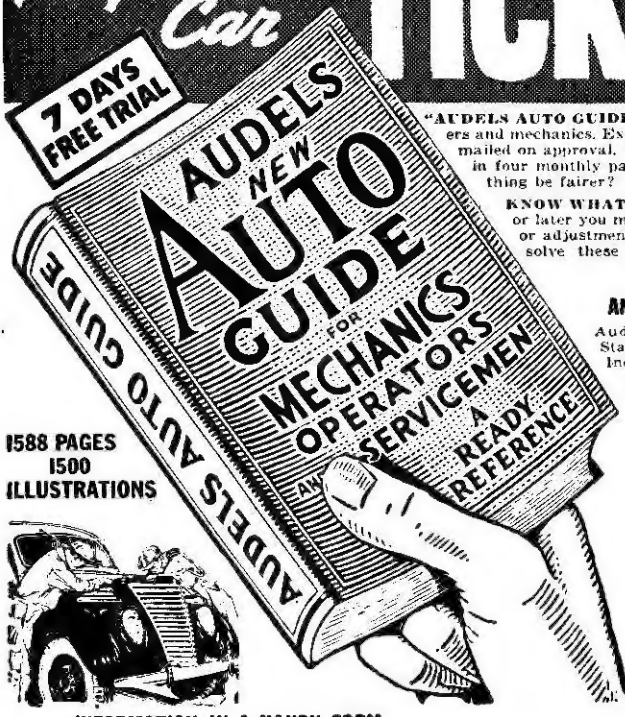

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